

10/656,086

I

=> FILE REG

FILE 'REGISTRY' ENTERED AT 12:06:00 ON 26 JUN 2007

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=> D HIS

FILE 'LREGISTRY' ENTERED AT 10:57:33 ON 26 JUN 2007

L1 STR

L2 STR

FILE 'HCAPLUS' ENTERED AT 11:07:06 ON 26 JUN 2007

L3 13393 S PARK Y?/AU

L4 4087 S JUNG W?/AU OR JUNG C?/AU

L5 8181 S KIM G?/AU

L6 16 S L3 AND L4 AND L5

SEL L6 13 RN

FILE 'REGISTRY' ENTERED AT 11:08:46 ON 26 JUN 2007

L7 54 S E1-E54

L8 0 S L7 AND PMS/CI

L9 13 S L7 AND LI/ELS

FILE 'HCA' ENTERED AT 11:12:37 ON 26 JUN 2007

L10 483877 S ELECTROLY?

L11 238757 S (BATTERY OR BATTERIES OR (ELECTROCHEM? OR ELECTROLY?  
OR

L12 199847 S (ORG# OR ORGANIC?)(2A)SOLVENT? OR NONAQ# OR  
NONAQUEOUS?

L13 QUE L9 OR LITHIUM# OR LI OR LITHIAT?

FILE 'REGISTRY' ENTERED AT 11:17:02 ON 26 JUN 2007

L14 1 S L1

L15 SCR 1782

L16 10 S L1 AND L15

L17 2387 S L1 AND L15 FUL

.SAV L17 WEI086/A

L18 50 S L2  
L19 11860 S L2 FUL  
SAV L19 WEI086A/A

FILE 'HCA' ENTERED AT 11:39:33 ON 26 JUN 2007

L20 8099 S L17  
L21 36604 S L19  
L22 132 S (L10 OR L11) AND L13 AND L20

FILE 'REGISTRY' ENTERED AT 11:40:30 ON 26 JUN 2007

L23 3 S L17 AND L7  
E BENZYL SULFONE/CN  
L24 1 S E3

FILE 'HCA' ENTERED AT 11:42:01 ON 26 JUN 2007

L25 3943 S L23 OR L24  
L26 91 S (L10 OR L11) AND L13 AND L25  
L27 5 S L26 AND L21  
L28 5 S L22 AND L21

FILE 'REGISTRY' ENTERED AT 11:43:48 ON 26 JUN 2007

E AIBN/CN  
L29 1 S E3

FILE 'HCA' ENTERED AT 11:46:06 ON 26 JUN 2007

L30 24698 S L29 OR AIBN OR ?AZOBISISOBUTYRONITRIL?  
L31 2 S L26 AND L30  
L32 3 S L22 AND L30

FILE 'LCA' ENTERED AT 11:47:04 ON 26 JUN 2007

L33 770 S POLYESTER# OR POLY(A)ESTER#  
L34 172 S POLYOL# OR POLYALC# OR POLYALCOHOL## OR POLYHYDRIC?

FILE 'HCA' ENTERED AT 11:48:14 ON 26 JUN 2007

L35 17232 S L33 AND L34

FILE 'REGISTRY' ENTERED AT 11:48:23 ON 26 JUN 2007

ACT POLYOLS/A

-----  
L36 ( 16)SEA FILE=REGISTRY (GLYCEROL OR DIGLYCEROL OR TRIGLYCEROL

L37 ( 1)SEA FILE=REGISTRY 7426-71-3  
L38 17 SEA FILE=REGISTRY L37 OR L36

-----  
E ACRYLIC ACID/CN

L39 1 S E3

E METHACRYLIC ACID/CN

L40 1 S E3

FILE 'HCA' ENTERED AT 11:52:36 ON 26 JUN 2007

L41 14888 S L38/D OR L38/DP

L42 31164 S L39/D OR L39/DP OR L40/D OR L40/DP

L43 694 S L41 AND L42

L44 12340 S (L10 OR L11) AND L12 AND L13

L45 66 S L44 AND (L20 OR L25)

L46 51 S L44 AND L25

L47 5 S L45 AND (L21 OR L30)

L48 3 S L45 AND L35

L49 2 S L45 AND L43

L50 6 S L27 OR L28 OR L31 OR L32 OR L47

L51 4 S L48 OR L49

L52 111105 S L38

L53 56465 S L39 OR L40

L54 2104 S L52 AND L53

L55 2 S L45 AND L54

L56 4 S L48 OR L49 OR L55

L57 36 S 1840-2002/PY,PRY AND L46

L58 33 S L57 AND L10 AND L11

FILE 'REGISTRY' ENTERED AT 12:06:00 ON 26 JUN 2007

=> D L17 QUE STAT

L1 STR

G1~S02~G1  
1 2 3

Ak @6

Cb @9

VAR G1=6/9

NODE ATTRIBUTES:

CONNECT IS E1 RC AT 6

CONNECT IS E1 RC AT 9

DEFAULT MLEVEL IS ATOM

GGCAT IS UNS AT 9

DEFAULT ECLEVEL IS LIMITED

GRAPH ATTRIBUTES:

RING(S) ARE ISOLATED OR EMBEDDED

NUMBER OF NODES IS 5

STEREO ATTRIBUTES: NONE

L15 SCR 1782

L17 2387 SEA FILE=REGISTRY SSS FUL L1 AND L15

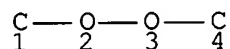
100.0% PROCESSED 435892 ITERATIONS

2387 ANSWERS

SEARCH TIME: 00.00.04

=> D L19 QUE STAT

L2 STR



NODE ATTRIBUTES:

DEFAULT MLEVEL IS ATOM

DEFAULT ECLEVEL IS LIMITED

GRAPH ATTRIBUTES:

RING(S) ARE ISOLATED OR EMBEDDED

NUMBER OF NODES IS 4

STEREO ATTRIBUTES: NONE

L19 11860 SEA FILE=REGISTRY SSS FUL L2

100.0% PROCESSED 14636 ITERATIONS

11860 ANSWERS



SEARCH TIME: 00.00.01

=> FILE HCA

FILE 'HCA' ENTERED AT 12:06:24 ON 26 JUN 2007

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=> D L58 1-33 CBIB ABS HITSTR HITIND

L58 ANSWER 1 OF 33 HCA COPYRIGHT 2007 ACS on STN

141:159902 **Electrolyte for lithium secondary**

**battery.** Kim, Jin-Sung; Lee, Jong-Wook; Kim, Kwang-Sik;

Kim, Young-Gyu; Kim, Je-Yun; Kim, Jong-Seob (S. Korea). U.S. Pat.

Appl. Publ. US 2004157133 A1 20040812, 12 pp., Cont.-in-part of U.S.

Ser. No. 766,520. (English). CODEN: USXXCO. APPLICATION: US

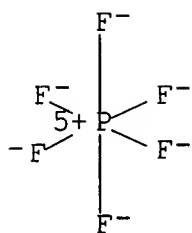
2003-718478 20031118. PRIORITY: US 2001-766520 20010119.

AB Described is an **electrolyte** for a **lithium secondary battery**. The **electrolyte** includes a **nonaq.** solvent and a sulfone-based org. compd. selected from 2,5-dihydrothiophene sulfone, a cyclic sulfone with a ring size of 5 to 8, and a sulfone represented by the formula  $RSO_3R_1$  (where R and  $R_1$  are independently selected from the group consisting of primary alkyl groups, secondary alkyl groups, tertiary alkyl groups, alkenyl groups, aryl groups; halogen-substituted primary alkyl groups, halogen-substituted secondary alkyl groups, halogen-substituted tertiary alkyl groups, halogen-substituted alkenyl groups, and halogen-substituted aryl groups) or a mixt. thereof.

IT **21324-40-3, Lithium hexafluorophosphate**  
(**electrolyte for lithium secondary**  
**battery**)

RN 21324-40-3 HCA

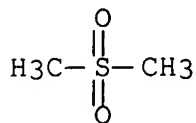
CN Phosphate(1-), hexafluoro-, lithium (1:1) (CA INDEX NAME)



IT 67-71-0, Methyl sulfone 77-77-0, Vinyl sulfone  
 127-63-9, Phenyl sulfone 620-32-6, Benzyl sulfone  
 (electrolyte for lithium secondary  
 battery)

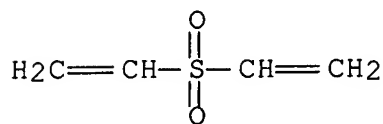
RN 67-71-0 HCA

CN Methane, 1,1'-sulfonylbis- (CA INDEX NAME)



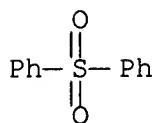
RN 77-77-0 HCA

CN Ethene, 1,1'-sulfonylbis- (CA INDEX NAME)



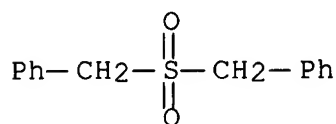
RN 127-63-9 HCA

CN Benzene, 1,1'-sulfonylbis- (CA INDEX NAME)



RN 620-32-6 HCA

CN Benzene, 1,1'-[sulfonylbis(methylene)]bis- (CA INDEX NAME)



IC ICM H01M010-40

ICS H01M004-58; H01M004-40

INCL 429326000; 429199000; 429332000; 429340000; 429231950; 429231800

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST **electrolyte lithium secondary battery**

IT Composites

(carbon; **electrolyte for lithium secondary battery**)

IT **Battery electrolytes**

(**electrolyte for lithium secondary battery**)

IT Aromatic hydrocarbons, uses

(**electrolyte for lithium secondary battery**)

IT Sulfones

(**electrolyte for lithium secondary battery**)

IT Transition metal oxides

(**lithiated; electrolyte for lithium secondary battery**)

IT **Secondary batteries**

(**lithium; electrolyte for lithium secondary battery**)

IT 71-43-2, Benzene, uses 96-49-1, Ethylene carbonate 98-95-3, Nitrobenzene, uses 105-58-8, Diethyl carbonate 108-88-3, Toluene, uses 108-90-7, Chlorobenzene, uses 462-06-6, Fluorobenzene 463-79-6D, Carbonic acid, ester, cyclic 463-79-6D, Carbonic acid, linear, cyclic, uses 616-38-6, Dimethyl carbonate 623-53-0, Ethylmethyl carbonate 1330-20-7, Xylene, uses 7439-93-2, **Lithium**, uses 7440-44-0, Carbon, uses **21324-40-3, Lithium hexafluorophosphate** 27359-10-0, Trifluorotoluene

(electrolyte for lithium secondary battery)

IT 67-71-0, Methyl sulfone 77-77-0, Vinyl sulfone 96-48-0,  $\gamma$ -Butyrolactone 126-33-0, Tetramethylene sulfone 127-63-9, Phenyl sulfone 383-29-9, 4-Fluorophenyl sulfone 620-32-6, Benzyl sulfone 28452-93-9, Butadiene sulfone (electrolyte for lithium secondary battery)

L58 ANSWER 2 OF 33 HCA COPYRIGHT 2007 ACS on STN

140:426121 **Electrolyte for a lithium ion**

**battery.** Noh, Hyeong-Gon (S. Korea). U.S. Pat. Appl. Publ.

US 2004101762 A1 20040527, 12 pp. (English). CODEN: USXXCO.

APPLICATION: US 2003-716812 20031118. PRIORITY: KR 2002-72475 20021120.

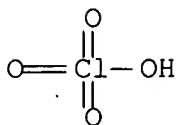
AB An **electrolyte for a lithium secondary battery** comprises a **nonaq. org. solvent** including 20 to 95 vol% of an ester-based or ether-based **org. solvent** based on the total amt. of **org. solvent**; **lithium** salts; and an additive compd. having at least two carbonate groups. A **lithium secondary battery** including this **electrolyte** has good swelling inhibition properties as well as electrochem. properties such as capacity and cycle life.

IT 7791-03-9, **Lithium perchlorate** 10377-51-2, **Lithium iodide** 14024-11-4, **Lithium tetrachloroaluminate** 14283-07-9, **Lithium tetrafluoroborate** 18424-17-4, **Lithium hexafluoroantimonate** 21324-40-3, **Lithium hexafluorophosphate** 29935-35-1, **Lithium hexafluoroarsenate** 33454-82-9, **Lithium triflate** 90076-65-6 131651-65-5

(electrolyte for lithium ion battery)

RN 7791-03-9 HCA

CN Perchloric acid, lithium salt (1:1) (CA INDEX NAME)



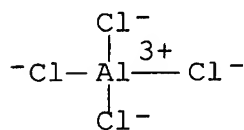
RN 10377-51-2 HCA

CN Lithium iodide (LiI) (CA INDEX NAME)



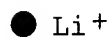
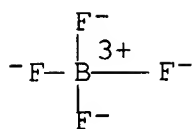
RN 14024-11-4 HCA

CN Aluminate(1-), tetrachloro-, lithium (1:1), (T-4)- (CA INDEX NAME)



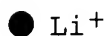
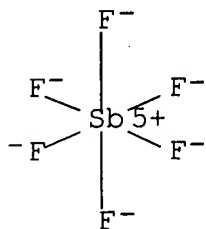
RN 14283-07-9 HCA

CN Borate(1-), tetrafluoro-, lithium (1:1) (CA INDEX NAME)



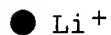
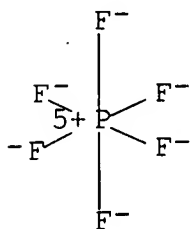
RN 18424-17-4 HCA

CN Antimonate(1-), hexafluoro-, lithium (1:1), (OC-6-11)- (CA INDEX NAME)



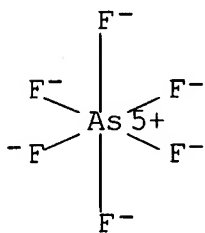
RN 21324-40-3 HCA

CN Phosphate(1-), hexafluoro-, lithium (1:1) (CA INDEX NAME)



RN 29935-35-1 HCA

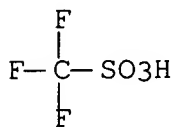
CN Arsenate(1-), hexafluoro-, lithium (1:1) (CA INDEX NAME)



● Li<sup>+</sup>

RN 33454-82-9 HCA

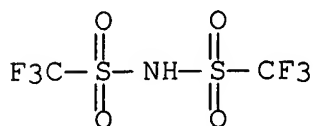
CN Methanesulfonic acid, 1,1,1-trifluoro-, lithium salt (1:1) (CA INDEX NAME)



● Li

RN 90076-65-6 HCA

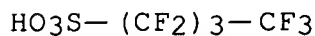
CN Methanesulfonamide, 1,1,1-trifluoro-N-[(trifluoromethyl)sulfonyl]-, lithium salt (1:1) (CA INDEX NAME)



● Li

RN 131651-65-5 HCA

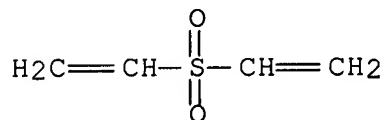
CN 1-Butanesulfonic acid, 1,1,2,2,3,3,4,4,4-nonafluoro-, lithium salt  
(1:1) (CA INDEX NAME)



IT 77-77-0, Vinyl sulfone  
(electrolyte for lithium ion battery  
)

RN 77-77-0 HCA

CN Ethene, 1,1'-sulfonylbis- (CA INDEX NAME)



IC ICM H01M010-40

INCL 429326000; 429329000; 429330000; 429331000; 429332000; 429340000

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST electrolyte lithium ion battery

IT Battery electrolytes  
(electrolyte for lithium ion battery  
)

IT Aromatic hydrocarbons, uses

Esters, uses

Ethers, uses

(electrolyte for lithium ion battery  
)

IT Sulfones



- (electrolyte for lithium ion battery  
)
- IT Swelling, physical  
(inhibition; electrolyte for lithium ion  
battery)
- IT Secondary batteries  
(lithium; electrolyte for lithium  
ion battery)
- IT 79-20-9, Methyl acetate 96-48-0,  $\gamma$ -Butyrolactone 96-49-1,  
Ethylene carbonate 105-58-8, Diethyl carbonate 108-32-7,  
Propylene carbonate 109-60-4, n-Propyl acetate 141-78-6, Ethyl  
acetate, uses 142-96-1, Dibutyl ether 462-06-6, Fluorobenzene  
463-79-6D, Carbonic acid, ester 616-38-6, Dimethyl carbonate  
623-53-0, Ethyl methyl carbonate 4437-85-8, Butylene carbonate  
7439-93-2D, **Lithium**, salt 7447-41-8, **Lithium**  
chloride (LiCl), uses 7791-03-9, **Lithium**  
perchlorate 10377-51-2, **Lithium** iodide  
12355-58-7 14024-11-4, **Lithium**  
tetrachloroaluminate 14283-07-9, **Lithium**  
tetrafluoroborate 18424-17-4, **Lithium**  
hexafluoroantimonate 21324-40-3, **Lithium**  
hexafluorophosphate 29935-35-1, **Lithium**  
hexafluoroarsenate 33454-82-9, **Lithium** triflate  
35363-40-7, Ethyl propyl carbonate, uses 56525-42-9, Methyl propyl  
carbonate, uses 90076-65-6 131651-65-5  
(electrolyte for lithium ion battery  
)
- IT 77-77-0, Vinyl sulfone 872-36-6, Vinylene carbonate  
692729-49-0 692729-52-5 692729-54-7 692729-56-9  
(electrolyte for lithium ion battery  
)

L58 ANSWER 3 OF 33 HCA COPYRIGHT 2007 ACS on STN  
140:238483 **Electrolyte for a lithium battery**

. Park, Yong-Chul; Jung, Won-Ii; Kim, Geun-Bae; Cho, Jae-Phil;  
Jung, Cheol-Soo (S. Korea). U.S. Pat. Appl. Publ. US 2004048163 A1  
20040311, 13 pp. (English). CODEN: USXXCO. APPLICATION: US  
2003-656086 20030905. PRIORITY: KR 2002-53879 20020906.

AB An electrolyte for a lithium battery includes a **nonaq. org. solvent**, a **lithium salt**, and  
an additive comprising (a) a sulfone-based compd. and (b) a C3-30 org. peroxide or azo-

based compd. The **electrolyte** may further include a poly(ester)(meth)acrylate or a polymer that is derived from a (polyester)polyol with at least three hydroxyl (-OH) groups, where a portion or all of the hydroxyl groups are substituted with a (meth)acrylic ester and the remaining hydroxyl groups that are not substituted with the (meth)acrylic ester are substituted with a group having no radical reactivity. The **lithium battery** comprising the **electrolyte** of the present invention has a significantly improved charge-discharge and cycle life characteristics, recovery capacity ratio at high temp., and swelling inhibition properties.

IT 7791-03-9, **Lithium perchlorate** 10377-51-2

, **Lithium iodide (LiI)** 14024-11-4,

**Lithium tetrachloroaluminate** 14283-07-9,

**Lithium tetrafluoroborate** 18424-17-4,

**Lithium hexafluoroantimonate** 21324-40-3,

**Lithium hexafluorophosphate** 29935-35-1,

**Lithium hexafluoroarsenate** 33454-82-9,

**Lithium triflate** 39300-70-4, **Lithium**

**nickel oxide** 90076-65-6 131651-65-5,

**Lithium nonafluorobutanesulfonate** 162684-16-4,

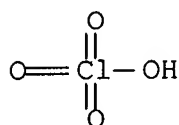
**Lithium manganese nickel oxide** 193215-00-8, **Cobalt**

**lithiummanganese nickel oxide** Co<sub>0.1</sub>LiMn<sub>0.2</sub>Ni<sub>0.7</sub>O<sub>2</sub>

(electrolyte for lithium battery)

RN 7791-03-9 HCA

CN Perchloric acid, lithium salt (1:1) (CA INDEX NAME)



● Li

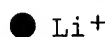
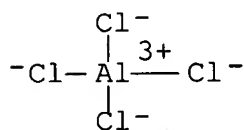
RN 10377-51-2 HCA

CN Lithium iodide (LiI) (CA INDEX NAME)

I—Li

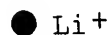
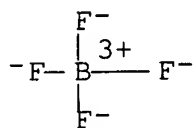
RN 14024-11-4 HCA

CN Aluminate(1-), tetrachloro-, lithium (1:1), (T-4)- (CA INDEX NAME)



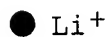
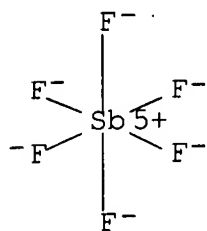
RN 14283-07-9 HCA

CN Borate(1-), tetrafluoro-, lithium (1:1) (CA INDEX NAME)



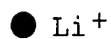
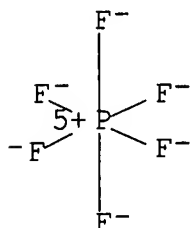
RN 18424-17-4 HCA

CN Antimonate(1-), hexafluoro-, lithium (1:1), (OC-6-11)- (CA INDEX NAME)



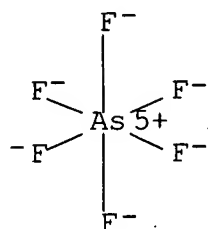
RN 21324-40-3 HCA

CN Phosphate(1-), hexafluoro-, lithium (1:1) (CA INDEX NAME)



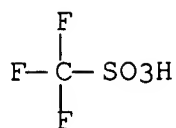
RN 29935-35-1 HCA

CN Arsenate(1-), hexafluoro-, lithium (1:1) (CA INDEX NAME)



RN 33454-82-9 HCA

CN Methanesulfonic acid, 1,1,1-trifluoro-, lithium salt (1:1) (CA INDEX NAME)



● Li

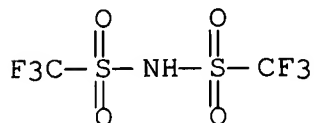
RN 39300-70-4 HCA

CN Lithium nickel oxide (CA INDEX NAME)

Component		Ratio		Component
				Registry Number
O		x		17778-80-2
Ni		x		7440-02-0
Li		x		7439-93-2

RN 90076-65-6 HCA

CN Methanesulfonamide, 1,1,1-trifluoro-N-[(trifluoromethyl)sulfonyl]-,  
lithium salt (1:1) (CA INDEX NAME)



● Li

RN 131651-65-5 HCA

CN 1-Butanesulfonic acid, 1,1,2,2,3,3,4,4,4-nonafluoro-, lithium salt  
(1:1) (CA INDEX NAME)

HO<sub>3</sub>S—(CF<sub>2</sub>)<sub>3</sub>—CF<sub>3</sub>

● Li

RN 162684-16-4 HCA

CN Lithium manganese nickel oxide (CA INDEX NAME)

Component		Ratio		Component
				Registry Number
O		x		17778-80-2
Ni		x		7440-02-0
Mn		x		7439-96-5
Li		x		7439-93-2

RN 193215-00-8 HCA

CN Cobalt lithium manganese nickel oxide (Co<sub>0.1</sub>LiMn<sub>0.2</sub>Ni<sub>0.7</sub>O<sub>2</sub>) (9CI)  
(CA INDEX NAME)

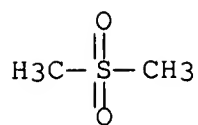
Component		Ratio		Component
				Registry Number
O		2		17778-80-2
Co		0.1		7440-48-4
Ni		0.7		7440-02-0
Mn		0.2		7439-96-5
Li		1		7439-93-2

IT 67-71-0, Methyl sulfone 77-77-0, Vinyl sulfone

127-63-9, Phenyl sulfone 620-32-6, Benzyl sulfone  
(electrolyte for lithium battery)

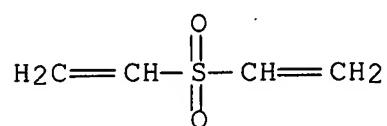
RN 67-71-0 HCA

CN Methane, 1,1'-sulfonylbis- (CA INDEX NAME)



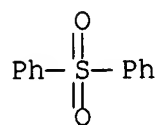
RN 77-77-0 HCA

CN Ethene, 1,1'-sulfonylbis- (CA INDEX NAME)



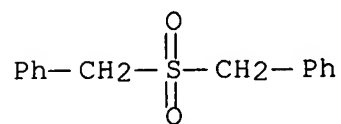
RN 127-63-9 HCA

CN Benzene, 1,1'-sulfonylbis- (CA INDEX NAME)



RN 620-32-6 HCA

CN Benzene, 1,1'-[sulfonylbis(methylene)]bis- (CA INDEX NAME)



IC ICM H01M010-40

INCL 429326000; 429329000; 429339000; 429340000

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

Section cross-reference(s): 38

ST **lithium battery electrolyte**

IT **Battery electrolytes**

(**electrolyte for lithium battery**)

IT Aromatic hydrocarbons, uses

Carbonates, uses

Esters, uses

Ethers, uses

Ketones, uses

(**electrolyte for lithium battery**)

IT Azo compounds

(**electrolyte for lithium battery**)

IT Carbonaceous materials (technological products)

(**electrolyte for lithium battery**)

IT Sulfones

(**electrolyte for lithium battery**)

IT Polyesters, uses

(hydroxy-terminated; **electrolyte for lithium battery**)

IT Secondary batteries

(**lithium; electrolyte for lithium battery**)

IT Polyesters, uses

(methacrylate; **electrolyte for lithium battery**)

IT Peroxides, uses

(org., C3-30; **electrolyte for lithium battery**)

IT Esters, uses

(poly-; **electrolyte for lithium battery**)

IT Imides

Sulfonic acids, uses

(sulfonimides, perfluoro derivs., **lithium salts; electrolyte for lithium battery**)

IT 56-81-5, Glycerol, uses 71-43-2, Benzene, uses 96-49-1, Ethylene carbonate 98-95-3, Nitrobenzene, uses 105-58-8, Diethyl carbonate 108-32-7, Propylene carbonate 108-88-3, Toluene, uses 108-90-7, Chlorobenzene, uses 149-32-6, Erythritol 462-06-6,



Fluorobenzene 616-38-6, Dimethyl carbonate 623-53-0, Methylethyl carbonate 623-96-1, Dipropyl carbonate 1330-20-7, Xylene, uses 4437-85-8, Butylene carbonate 7790-99-0, Iodine chloride (ICl) 7791-03-9, **Lithium perchlorate 10377-51-2**, **Lithium iodide (LiI) 14024-11-4**, **Lithium tetrachloroaluminate 14283-07-9**, **Lithium tetrafluoroborate 18424-17-4**, **Lithium hexafluoroantimonate 21324-40-3**, **Lithium hexafluorophosphate 27359-10-0**, Trifluorotoluene 29935-35-1, **Lithium hexafluoroarsenate 33454-82-9**, **Lithium triflate 35363-40-7**, Ethyl propyl carbonate, uses 39300-70-4, **Lithium nickel oxide 56525-42-9**, Methyl propyl carbonate, uses 90076-65-6 131651-65-5, **Lithium nonafluorobutanesulfonate 162684-16-4**, **Lithium manganese nickel oxide 193215-00-8**, Cobalt lithiummanganese nickel oxide  $\text{Co}_{0.1}\text{LiMn}_{0.2}\text{Ni}_{0.7}\text{O}_2$  (electrolyte for lithium battery)

IT 67-71-0, Methyl sulfone 77-77-0, Vinyl sulfone 78-67-1, 2,2'-Azobisisobutyronitrile 94-36-0, Benzoyl peroxide, uses 105-64-6, Diisopropyl peroxy dicarbonate 105-74-8, Lauroyl peroxide 126-33-0, Tetramethylene sulfone 127-63-9, Phenyl sulfone 620-32-6, Benzyl sulfone 1561-49-5, Dicyclohexylperoxy dicarbonate 1712-87-4, m-Toluoyl peroxide 3006-82-4, tert-Butylperoxy-2-ethyl hexanoate 14666-78-5 15520-11-3, Bis(4-tert-butylcyclohexyl)peroxy dicarbonate 26748-41-4 28452-93-9, Butadiene sulfone 32752-09-3, Isobutyl peroxide 92177-99-6, 3,3,5-Trimethylhexanoyl peroxide (electrolyte for lithium battery)

IT 79-10-7DP, Acrylic acid, reaction product with dipentaerythritol and  $\epsilon$ -caprolactone and butylcarbonic acid 126-58-9DP, Dipentaerythritol, reaction product with  $\epsilon$ -caprolactone and acrylic acid and butylcarbonic acid 502-44-3DP,  $\epsilon$ -Caprolactone, reaction product with dipentaerythritol and acrylic acid and butylcarbonic acid 10411-26-4DP, MonoButylcarbonate, reaction product with dipentaerythritol and  $\epsilon$ -caprolactone and acrylic acid (electrolyte for lithium battery)

L58 ANSWER 4 OF 33 HCA COPYRIGHT 2007 ACS on STN

140:149224 **Nonaqueous electrolytic solution with**

**improved safety for lithium battery.** Kim,

Jun-ho; Lee, Ha-young; Choy, Sang-hoon; Kim, Ho-sung (Samsung SDI Co., Ltd., S. Korea). U.S. Pat. Appl. Publ. US 2004029018 A1

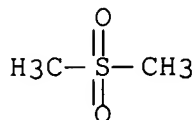
20040212, 12 pp. (English). CODEN: USXXCO. APPLICATION: US 2003-637554 20030811. PRIORITY: KR 2002-47510 20020812.

AB A **nonaq. electrolytic soln.** and a **lithium battery** employing the same include a **lithium salt**, an **org. solvent**, and a halogenated benzene compd. The use of the **nonaq. electrolytic soln.** causes formation of a polymer by oxidative decompn. of the **electrolytic soln.** even if a sharp voltage increase occurs due to overcharging of the **battery**, leading to consumption of an overcharge current, thus protecting the **battery**.

IT 67-71-0, Methyl sulfone 77-77-0, Vinyl sulfone  
127-63-9, Phenyl sulfone 620-32-6, Benzyl sulfone  
21324-40-3, **Lithium hexafluorophosphate**  
(**nonaq. electrolytic soln.** with improved  
safety for **lithium battery**)

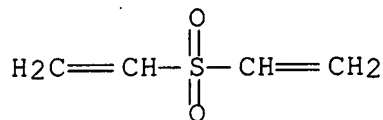
RN 67-71-0 HCA

CN Methane, 1,1'-sulfonylbis- (CA INDEX NAME)



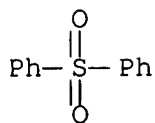
RN 77-77-0 HCA

CN Ethene, 1,1'-sulfonylbis- (CA INDEX NAME)



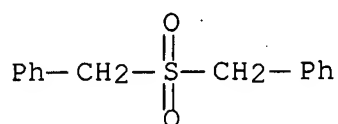
RN 127-63-9 HCA

CN Benzene, 1,1'-sulfonylbis- (CA INDEX NAME)



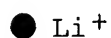
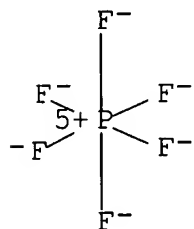
RN 620-32-6 HCA

CN Benzene, 1,1'-[sulfonylbis(methylene)]bis- (CA INDEX NAME)



RN 21324-40-3 HCA

CN Phosphate(1-), hexafluoro-, lithium (1:1) (CA INDEX NAME)



IC ICM H01M010-40

INCL 429326000; 429200000; 429340000; 429331000; 429332000

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST **lithium battery nonaq**

**electrolyte soln improved safety**

IT Esters, uses

Ethers, uses

Hydrocarbons, uses

- (C1-20; **nonaq. electrolytic soln. with improved safety for lithium battery**)
- IT Aromatic hydrocarbons, uses  
(C5-20; **nonaq. electrolytic soln. with improved safety for lithium battery**)
- IT Secondary **batteries**  
(**lithium; nonaq. electrolytic soln. with improved safety for lithium battery**)
- IT **Battery electrolytes**  
(**nonaq. electrolytic soln. with improved safety for lithium battery**)
- IT Polyesters, uses  
(**nonaq. electrolytic soln. with improved safety for lithium battery**)
- IT Alcohols, uses  
(polyhydric; **nonaq. electrolytic soln. with improved safety for lithium battery**)
- IT 3087-37-4, Tetrapropyltitanate  
(**nonaq. electrolytic soln. with improved safety for lithium battery**)
- IT 502-44-3,  $\epsilon$ -Caprolactone 7439-93-2D, **Lithium**, salt 12190-79-3, Cobalt **lithium oxide colio2**  
(**nonaq. electrolytic soln. with improved safety for lithium battery**)
- IT 126-58-9DP, Dipentaerythritol, deriv.  
(**nonaq. electrolytic soln. with improved safety for lithium battery**)
- IT 56-81-5, Glycerol, uses 67-71-0, Methyl sulfone 71-43-2D, Benzene, halogenated 77-77-0, Vinyl sulfone 94-36-0, Benzoylperoxide, uses 96-49-1, Ethylene carbonate 105-64-6, Diisopropyl peroxy dicarbonate 105-74-8, Lauroyl peroxide 108-32-7, Propylene carbonate 115-77-5, Pentaerythritol, uses 126-33-0, Tetramethylene sulfone 126-58-9, DiPentaerythritol 127-63-9, Phenyl sulfone 456-55-3, Trifluoromethyl phenyl ether 462-06-6, Fluorobenzene 620-32-6, Benzyl sulfone 623-53-0, Ethyl methyl carbonate 1561-49-5, Dicyclohexyl peroxy dicarbonate 1712-87-4, m-Toluoyl peroxide 2972-19-2 3006-82-4, tert-Butylperoxy-2-ethylhexanoate 9002-88-4, Polyethylene 9003-07-0, Polypropylene 14666-78-5 15520-11-3, Bis(4-tert-butylcyclohexyl) peroxydicarbonate

21151-56-4, Benzene, 1-chloro-4-(chloromethoxy)- 21324-40-3  
, **Lithium** hexafluorophosphate 28452-93-9, Butadiene  
sulfone 32752-09-3, Isobutyl peroxide 92177-99-6,  
3,3,5-Trimethylhexanoylperoxide 130038-50-5, 2-Propenoic acid,  
2-methyl-, ion(1-) homopolymer, uses 651294-25-6 651294-26-7  
651294-27-8  
(**nonaq. electrolytic soln.** with improved  
safety for **lithium battery**)

L58 ANSWER 5 OF 33 HCA COPYRIGHT 2007 ACS on STN

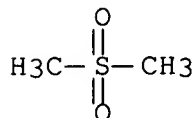
140:96917 **Nonaqueous electrolytic solution** for  
**lithium battery.** Abe, Koji; Hattori, Takayuki;  
Matsumori, Yasuo (Ube Industries, Ltd., Japan). U.S. Pat. Appl.  
Publ. US 2004013946 A1 20040122, 10 pp. (English). CODEN: USXXCO.  
APPLICATION: US 2003-619005 20030715. PRIORITY: JP 2002-205560  
20020715; JP 2002-326391 20021111.

AB A **nonaq. electrolytic soln.** comprising a **nonaq.** solvent and an **electrolyte**, which  
further contains a combination of a nitrile compd. and an S=O group-contg. compd. (or a  
dinitrile compd.) in an amt. of 0.001 to 10 wt.% imparts improved cycle performance  
and storage property to a **lithium battery**, particularly a **lithium secondary battery**.

IT 67-71-0, Dimethyl sulfone 77-77-0, Divinyl sulfone  
14283-07-9, **Lithium** tetrafluoroborate  
21324-40-3, **Lithium** hexafluorophosphate  
(**nonaq. electrolytic soln.** for  
**lithium battery**)

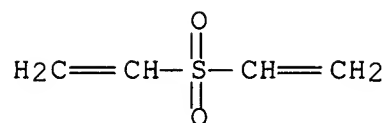
RN 67-71-0 HCA

CN Methane, 1,1'-sulfonylbis- (CA INDEX NAME)



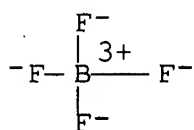
RN 77-77-0 HCA

CN Ethene, 1,1'-sulfonylbis- (CA INDEX NAME)



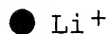
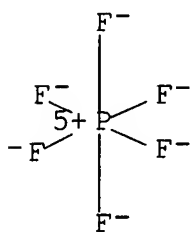
RN 14283-07-9 HCA

CN Borate(1-), tetrafluoro-, lithium (1:1) (CA INDEX NAME)



RN 21324-40-3 HCA

CN Phosphate(1-), hexafluoro-, lithium (1:1) (CA INDEX NAME)



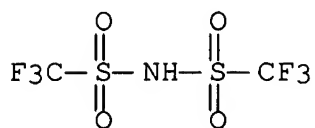
IT 90076-65-6

(nonaq. electrolytic soln. for  
lithium battery)

RN 90076-65-6 HCA

CN Methanesulfonamide, 1,1,1-trifluoro-N-[(trifluoromethyl)sulfonyl]-,

lithium salt (1:1) (CA INDEX NAME)



● Li

IC ICM H01M010-40

ICS H01M004-58

INCL 429326000; 429339000; 429340000; 429330000; 429231800

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST **lithium battery nonaq**

**electrolyte nitrile sulfite additive**

IT **Primary batteries**

**Secondary batteries**

**(lithium; nonaq. electrolytic soln.**

**for lithium battery)**

IT **Battery electrolytes**

**(nonaq. electrolytic soln. for**

**lithium battery)**

IT Ethers, uses

Lactones

Nitriles, uses

**(nonaq. electrolytic soln. for**

**lithium battery)**

IT 64-67-5, Diethyl sulfate 66-27-3, Methyl methanesulfonate

67-71-0, Dimethyl sulfone 75-05-8, Acetonitrile, uses

77-77-0, Divinyl sulfone 77-78-1, Dimethyl sulfate

77-79-2, Sulfolene 80-18-2, Methyl benzenesulfonate 91-15-6,

1,2-Dicyanobenzene 96-48-0,  $\gamma$ -Butyrolactone 96-49-1,

Ethylene carbonate 100-47-0, Benzonitrile, uses 107-12-0,

Propionitrile 109-74-0, Butyronitrile 110-59-8, Valeronitrile

110-61-2, Succinonitrile 111-69-3, Adiponitrile 124-12-9,

Octanenitrile 126-33-0, Sulfolane 140-29-4, Phenylacetone nitrile

463-79-6D, Carbonic acid, cyclic compd. 463-79-6D, Carbonic acid,

linear compd. 544-13-8; Glutaronitrile 594-43-4, Ethyl methyl sulfone 597-35-3, Diethyl sulfone 616-42-2, Dimethyl sulfite 623-26-7, 1,4-Dicyanobenzene 623-53-0, Ethyl methylcarbonate 623-81-4, Diethyl sulfite 626-17-5, 1,3-Dicyanobenzene 628-73-9, Hexanenitrile 629-40-3, 1,6-Dicyanohexane 646-20-8, 1,5-Dicyanopentane 766-05-2, Cyclohexanecarbonitrile 1120-71-4, 1,3-Propanesultone 1469-73-4, Propylene sulfite 1633-83-6, 1,4-Butanesultone 1675-69-0, 1,7-Dicyanoheptane 1871-96-1, 1,8-Dicyanooctane 1975-78-6, Decanenitrile 2244-07-7, Undecanenitrile 3333-52-6, Tetramethylsuccinonitrile 3741-38-6, Ethylene sulfite 4543-66-2, 1,10-Dicyanodecane 4553-62-2, 2-Methylglutaronitrile 5763-80-4 7735-44-6, 1,12-Dicyanododecane 10526-16-6 **14283-07-9**, Lithium tetrafluoroborate 15074-49-4, Pentanedinitrile, 2,4-dimethyl- 16525-39-6 **21324-40-3**, Lithium hexafluorophosphate 51937-69-0, Pentanedinitrile, 2,2,4,4-tetramethyl- 71172-36-6, 1,9-Dicyanononane 88691-89-8 88691-90-1 88691-91-2 478784-91-7, Ethylene glycol sulfate 643026-52-2 643764-77-6

(nonaq. electrolytic soln. for lithium battery)

IT 5129-37-3, Butyl pivalate **90076-65-6**  
(nonaq. electrolytic soln. for lithium battery)

L58 ANSWER 6 OF 33 HCA COPYRIGHT 2007 ACS on STN

139:398049 Secondary **nonaqueous-electrolyte**

**battery with electrolyte** containing overcharging

inhibitor and sulfur compound. Kotado, Minoru (Mitsubishi Chemical Corp., Japan). Jpn. Kokai Tokkyo Koho JP 2003338317 A 20031128, 8 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 2002-143492 20020517.

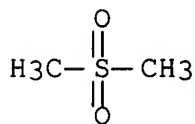
AB The claimed **battery** is equipped with an **electrolyte** soln. contg. a compd. which reacts under voltage equal to or higher than max. operation voltage during overcharging, a cyclic carbonate ester having unsatd. bond and/or an acid anhydride, and a S-contg. org. compd. The **battery** provides high safety during overcharging and high-load discharge capacity after storage.

IT 67-71-0, Dimethylsulfone  
(**electrolyte** contg. overcharging inhibitor and sulfur compd. for **nonaq. battery**)

RN 67-71-0 HCA



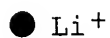
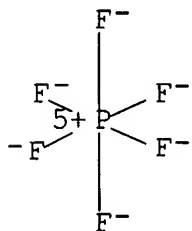
CN Methane, 1,1'-sulfonylbis- (CA INDEX NAME)



IT 21324-40-3, Lithium hexafluorophosphate  
(electrolyte; electrolyte contg. overcharging  
inhibitor and sulfur compd. for nonaq. battery  
)

RN 21324-40-3 HCA

CN Phosphate(1-), hexafluoro-, lithium (1:1) (CA INDEX NAME)



IC ICM H01M010-40

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST sulfur compd cyclic carbonate anhydride electrolyte

nonaq battery; overcharging inhibitor

electrolyte nonaq battery safety

IT Battery electrolytes

Safety

(electrolyte contg. overcharging inhibitor and sulfur  
compd. for nonaq. battery)

IT Secondary batteries

(lithium; electrolyte contg. overcharging  
inhibitor and sulfur compd. for nonaq. battery)

- )
- IT 108-30-5, Succinic anhydride, uses 872-36-6, Vinylene carbonate  
(additive; **electrolyte** contg. overcharging inhibitor  
and sulfur compd. for **nonaq. battery**)
- IT 66-27-3, Methyl methanesulfonate 67-71-0, Dimethylsulfone  
1120-71-4, 1,3-Propanesultone  
(**electrolyte** contg. overcharging inhibitor and sulfur  
compd. for **nonaq. battery**)
- IT 96-49-1, Ethylene carbonate 623-53-0, Ethyl methyl carbonate  
(**electrolyte** solvent; **electrolyte** contg.  
overcharging inhibitor and sulfur compd. for **nonaq.  
battery**)
- IT 21324-40-3, **Lithium** hexafluorophosphate  
(**electrolyte**; **electrolyte** contg. overcharging  
inhibitor and sulfur compd. for **nonaq. battery**)
- )
- IT 92-52-4, Biphenyl, uses 827-52-1, Cyclohexylbenzene  
(overcharging inhibitor; **electrolyte** contg.  
overcharging inhibitor and sulfur compd. for **nonaq.  
battery**)

L58 ANSWER 7 OF 33 HCA COPYRIGHT 2007 ACS on STN

139:326026 **Nonaqueous electrolyte** solution for

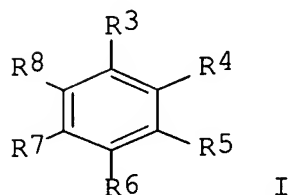
**Li** secondary **battery**. Noda, Daisuke; Shizuka,

Kenji; Kinoshita, Shinichi (Mitsubishi Chemical Corp., Japan). Jpn.

Kokai Tokkyo Koho JP 2003297423 A 20031017, 10 pp. (Japanese).

CODEN: JKXXAF. APPLICATION: JP 2002-100543 20020402.

GI



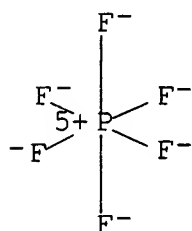
AB The invention relates to a **nonaq. electrolyte soln.** for a **Li secondary battery**, comprising: the sulfone compd. represented by  $\text{SO}_2(\text{R}_1)(\text{R}_2)$  [ $\text{R}_1$  and  $\text{R}_2$  = aryl, and alkyl;  $\text{R}_1$  and  $\text{R}_2$  may be joined to form a ring structure]; and the arom. compd. with the mol. wt.  $\leq 500$  and represented by  $\text{I}$  [ $\text{R}_{3-8}$  = H, halo, C1-12 alkyl, C5-12 cycloalkyl, C6-12 aryl, and C11-14 arylcycloalkyl].

IT 21324-40-3, **Lithium hexafluorophosphate** ( $\text{LiPF}_6$ )

(**nonaq. electrolyte soln.** for **Li secondary battery**)

RN 21324-40-3 HCA

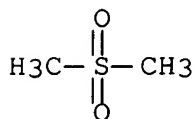
CN Phosphate(1-), hexafluoro-, lithium (1:1) (CA INDEX NAME)



IT 67-71-0, **Dimethylsulfone**  
(overcharging prevention agent; **nonaq.**  
**electrolyte soln.** for **Li secondary battery**)

RN 67-71-0 HCA

CN Methane, 1,1'-sulfonylbis- (CA INDEX NAME)



IC ICM H01M010-40

ICS H01M004-58

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST **nonaq electrolyte soln lithium**

secondary battery

IT **Battery electrolytes**

Secondary batteries

(**nonaq. electrolyte soln. for Li**  
secondary battery)

IT Sulfones

(**nonaq. electrolyte soln. for Li**  
secondary battery)

IT **Electrolytes**

(**nonaq.; nonaq. electrolyte soln.**  
for Li secondary battery)

IT 96-49-1, Ethylenecarbonate 105-58-8, Diethylcarbonate

(**electrolyte soln.; nonaq.**  
**electrolyte soln. for Li secondary**  
battery)

IT 21324-40-3, **Lithium** hexafluorophosphate (LiPF<sub>6</sub>)

(**nonaq. electrolyte soln. for Li**  
secondary battery)

IT 872-36-6, Vinylencarbonate

(**nonaq. electrolyte soln. for Li**  
secondary battery)

IT 67-71-0, Dimethylsulfone 132-64-9, Dibenzofuran

827-52-1, Cyclohexylbenzene

(overcharging prevention agent; **nonaq.**  
**electrolyte soln. for Li secondary**  
battery)

L58 ANSWER 8 OF 33 HCA COPYRIGHT 2007 ACS on STN

139:294681 **Electrolyte for lithium battery**

to reduce overcharge and improve electrochemical characteristics.

Kim, Jun-Ho; Lee, Ha-Young; Choy, Sang-Hoon; Kim, Ho-Sung; Noh,  
Hyeong-Gon (Samsung SDI Co., Ltd., S. Korea). U.S. Pat. Appl. Publ.

US 2003190529 A1 20031009, 19 pp. (English). CODEN: USXXCO.

APPLICATION: US 2003-393294 20030321. PRIORITY: KR 2002-18264  
20020403.

AB An **electrolyte** for a **lithium battery** includes a **nonaq. org. solvent**, a **lithium salt**, and  
an additive comprising (a) a compd. represented by the formula [(R<sub>1</sub>)<sub>n</sub>C<sub>6</sub>H(6-

n+m)(X)m], and (b) a compd. selected from the group consisting of a sulfone-based compd., a poly(ester)(meth)acrylate, a polymer of poly(ester)(meth)acrylate, and a mixt. thereof: wherein R1 is a C1-10 alkyl, a C 1-10 alkoxy, or a C6-10 aryl, and preferably a Me, Et, or methoxy, X is a halogen, and m and n are integers ranging from 1 to 5, where m+n is less than or equal to 6.

IT 7791-03-9, **Lithium perchlorate 10377-51-2**

, **Lithium iodide (LiI) 14283-07-9,**

**Lithium tetrafluoroborate 18424-17-4,**

**Lithium hexafluoroantimonate 21324-40-3,**

**Lithium hexafluorophosphate 29935-35-1,**

**Lithium hexafluoroarsenate 33454-82-9,**

**Lithium triflate 90076-65-6 131651-65-5,**

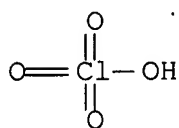
**Lithium perfluorobutanesulfonate**

**(electrolyte for lithium battery to**

**reduce overcharge and improve electrochem. characteristics)**

RN 7791-03-9 HCA

CN Perchloric acid, lithium salt (1:1) (CA INDEX NAME)



● Li

RN 10377-51-2 HCA

CN Lithium iodide (LiI) (CA INDEX NAME)

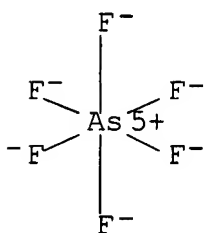
I—Li

RN 14283-07-9 HCA

CN Borate(1-), tetrafluoro-, lithium (1:1) (CA INDEX NAME)

RN 29935-35-1 HCA

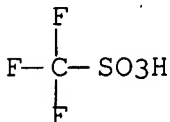
CN Arsenate(1-), hexafluoro-, lithium (1:1) (CA INDEX NAME)



● Li<sup>+</sup>

RN 33454-82-9 HCA

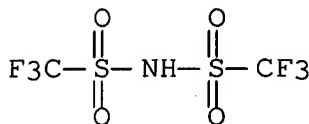
CN Methanesulfonic acid, 1,1,1-trifluoro-, lithium salt (1:1) (CA INDEX NAME)



● Li

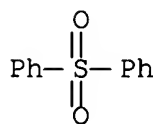
RN 90076-65-6 HCA

CN Methanesulfonamide, 1,1,1-trifluoro-N-[(trifluoromethyl)sulfonyl]-, lithium salt (1:1) (CA INDEX NAME)



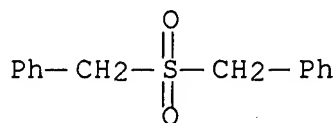
● Li

CN Benzene, 1,1'-sulfonylbis- (CA INDEX NAME)



RN 620-32-6 HCA

CN Benzene, 1,1'-[sulfonylbis(methylene)]bis- (CA INDEX NAME)



IC ICM H01M006-18

INCL 429307000; 429309000; 429326000; 429322000; 429323000; 429330000

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST **lithium battery electrolyte overcharge**

lowering

IT **Battery electrolytes**

(**electrolyte for lithium battery to**  
**reduce overcharge and improve electrochem. characteristics)**

IT **Secondary batteries**

(**lithium; electrolyte for lithium**  
**battery to reduce overcharge and improve electrochem.**  
**characteristics)**

IT **Peroxides, uses**

(**org.; electrolyte for lithium**  
**battery to reduce overcharge and improve electrochem.**  
**characteristics)**

IT **Alcohols, uses**

(**trihydric; electrolyte for lithium**  
**battery to reduce overcharge and improve electrochem.**  
**characteristics)**

IT 3087-37-4, Tetrapropyltitanate

- (electrolyte for lithium battery to reduce overcharge and improve electrochem. characteristics)
- IT 71-43-2, Benzene, uses 96-49-1, Ethylene carbonate 105-58-8, Diethyl carbonate 108-32-7, Propylene carbonate 108-88-3, Toluene, uses 462-06-6, Fluorobenzene 616-38-6, Dimethyl carbonate 623-53-0, Ethyl methyl carbonate 623-96-1, Dipropyl carbonate 1330-20-7, Xylene, uses 4437-85-8, Butylene carbonate 7447-41-8, **Lithium chloride (LiCl)**, uses 7791-03-9, **Lithium perchlorate 10377-51-2**, **Lithium iodide (LiI) 12355-58-7**, **Lithium aluminate (Li<sub>5</sub>AlO<sub>4</sub>) 14283-07-9**, **Lithium tetrafluoroborate 18424-17-4**, **Lithium hexafluoroantimonate 21324-40-3**, **Lithium hexafluorophosphate 27359-10-0**, Trifluorotoluene **29935-35-1**, **Lithium hexafluoroarsenate 33454-82-9**, **Lithium triflate 35363-40-7**, Ethyl propyl carbonate, uses 56525-42-9, Methyl propyl carbonate, uses 90076-65-6 **131651-65-5**, **Lithium perfluorobutanesulfonate**
- (electrolyte for lithium battery to reduce overcharge and improve electrochem. characteristics)
- IT 126-58-9DP, Dipentaerythritol, reaction product with  $\epsilon$ -caprolactone 502-44-3DP,  $\epsilon$ -Caprolactone, reaction product with dipentaerythritol 609772-45-4P
- (electrolyte for lithium battery to reduce overcharge and improve electrochem. characteristics)
- IT 56-81-5, Glycerol, uses 67-71-0, Methyl sulfone 77-77-0, Vinyl sulfone 79-10-7D, Acrylic acid,  $\omega$ -fatty acid esters C2-C21 79-41-4D, Methacrylic acid,  $\omega$ -fatty acid esters C2-C21 94-36-0, Benzoyl peroxide, uses 104-92-7, 4-Bromoanisole 105-64-6, Diisopropyl peroxy dicarbonate 105-74-8, Lauroyl peroxide 126-33-0, Tetramethylene sulfone **127-63-9**, Phenyl sulfone 149-32-6, Erythritol 452-10-8, 2,4-Difluoroanisole 456-49-5, 3-Fluoroanisole 459-60-9, 4-Fluoroanisole **620-32-6**, Benzyl sulfone 623-12-1, 4-Chloroanisole 1561-49-5, Dicyclohexyl peroxy dicarbonate 1712-87-4, m-Toluoyl peroxide 2398-37-0, 3-Bromoanisole 2845-89-8, 3-Chloroanisole 3006-82-4, tert-Butylperoxy-2-ethylhexanoate 14666-78-5 15520-11-3, Bis(4-tert-butylcyclohexyl)peroxy dicarbonate 28452-93-9, Butadiene sulfone



32752-09-3, Isobutyl peroxide 92177-99-6, 3,3,5-Trimethylhexanoyl  
peroxide 93343-10-3, 3,5-Difluoroanisole 202925-08-4,  
3-Chloro-5-fluoroanisole 609365-67-5  
(electrolyte for lithium battery to  
reduce overcharge and improve electrochem. characteristics)

L58 ANSWER 9 OF 33 HCA COPYRIGHT 2007 ACS on STN

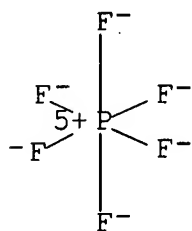
139:233057 Method for production of anode active material composition  
for a rechargeable **lithium battery**. Kim,  
Chang-Seob; Kim, Ju-Hyung; Park, Un-Sick (Samsung Sdi Co., Ltd., S.  
Korea). U.S. Pat. Appl. Publ. US 2003170534 A1 20030911, 6 pp.  
(English). CODEN: USXXCO. APPLICATION: US 2003-371299 20030221.  
PRIORITY: KR 2002-11952 20020306.

AB Disclosed is a neg. active material compn. for a rechargeable **lithium battery**, a method  
of producing a neg. electrode for a rechargeable **lithium battery** using the same, and a  
rechargeable **lithium battery** using the same. The neg. active material compn. includes  
a neg. active material, an additive capable of forming a surface **electrolyte** interface film  
on a neg. electrode during charge and discharge, a binder, and an **org. solvent**.

IT **21324-40-3, Lithium hexafluorophosphate**  
(method for prodn. of anode active material compn. for  
rechargeable **lithium battery**)

RN 21324-40-3 HCA

CN Phosphate(1-), hexafluoro-, lithium (1:1) (CA INDEX NAME)

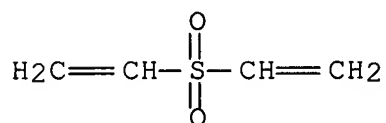


● Li<sup>+</sup>

IT **77-77-0, Vinyl sulfone**  
(method for prodn. of anode active material compn. for  
rechargeable **lithium battery**)

RN 77-77-0 HCA

CN Ethene, 1,1'-sulfonylbis- (CA INDEX NAME)



IC ICM H01M002-16

ICS B05D005-12; H01M004-58

INCL 429137000; X42-923.18; X42-7 5.8; X42-923.195; X42-922.4; X42-922.3;  
X42-922.1; X42-923.16; X42-923.15

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST anode active material compn rechargeable **lithium**  
**battery**

IT Secondary **batteries**

(**lithium**; method for prodn. of anode active material  
compn. for rechargeable **lithium battery**)

IT **Battery** anodes

(method for prodn. of anode active material compn. for  
rechargeable **lithium battery**)

IT Carbonaceous materials (technological products)

(method for prodn. of anode active material compn. for  
rechargeable **lithium battery**)

IT Fluoropolymers, uses

(method for prodn. of anode active material compn. for  
rechargeable **lithium battery**)

IT 96-49-1, Ethylene carbonate 105-58-8, Diethyl carbonate

7440-50-8, Copper, uses 7782-42-5, Graphite, uses 9003-07-0,

Polypropylene 12190-79-3, Cobalt **lithium** oxide colio2

**21324-40-3, Lithium** hexafluorophosphate

(method for prodn. of anode active material compn. for  
rechargeable **lithium battery**)

IT 77-77-0, Vinyl sulfone 872-36-6, Vinylene carbonate

1120-71-4, 1,3-Propanesultone 7446-09-5, Sulfur dioxide, uses

7704-34-9D, Sulfur, compd. 7723-14-0D, Phosphorus, compd.

24937-79-9, PvdF

(method for prodn. of anode active material compn. for  
rechargeable **lithium battery**)

L58 ANSWER 10 OF 33 HCA COPYRIGHT 2007 ACS on STN

139:166961 Secondary **nonaqueous-electrolyte**

**battery with electrolyte** solvent containing chain

ester. Murai, Tetsuya (Japan Storage Battery Co., Ltd., Japan).

Jpn. Kokai Tokkyo Koho JP 2003229168 A 20030815, 12 pp.

(Japanese). CODEN: JKXXAF. APPLICATION: JP 2002-25969 20020201.

AB The claimed **battery** is equipped with a **nonaq.- electrolyte** solvent contg. a chain carbonate ester R1OCO2R2 (R1 = C4-12 hydrocarbyl; R2 = C1-12 hydrocarbyl) and ≥80 vol.% ethylene carbonate, propylene carbonate, and/or γ-butyrolactone. The resulting **nonaq. electrolyte** provides high wettability to give a **battery** showing high charging-discharging performance and expansion prevention during high-temp. storage.

IT 77-77-0, Divinyl sulfone

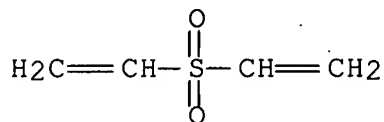
(solvent; secondary **nonaq.-electrolyte**

**battery with electrolyte** solvent contg. chain

ester)

RN 77-77-0 HCA

CN Ethene, 1,1'-sulfonylbis- (CA INDEX NAME)



IC ICM H01M010-40

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST **nonaq electrolyte** solvent chain ester secondary

**battery**

IT Secondary **batteries**

(**lithium**; secondary **nonaq.-**

**electrolyte battery with electrolyte**

solvent contg. chain ester)

IT **Battery electrolytes**

(secondary **nonaq.-electrolyte battery**

with **electrolyte** solvent contg. chain ester)

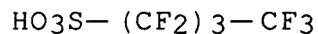
IT 542-52-9, Di-n-butyl carbonate 1680-31-5, Dioctyl carbonate

4824-75-3 6290-55-7, Di n-decyl carbonate 6482-34-4, Diisopropyl

carbonate 7523-15-1, Di n-hexyl carbonate 30714-78-4

RN 131651-65-5 HCA

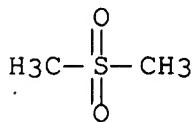
CN 1-Butanesulfonic acid, 1,1,2,2,3,3,4,4,4-nonafluoro-, lithium salt  
(1:1) (CA INDEX NAME)



IT 67-71-0, Methyl sulfone 77-77-0, Vinyl sulfone  
127-63-9, Phenyl sulfone 620-32-6, Benzyl sulfone  
(electrolyte for lithium battery to  
reduce overcharge and improve electrochem. characteristics)

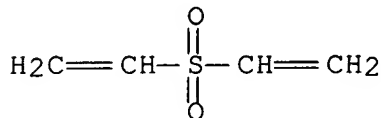
RN 67-71-0 HCA

CN Methane, 1,1'-sulfonylbis- (CA INDEX NAME)



RN 77-77-0 HCA

CN Ethene, 1,1'-sulfonylbis- (CA INDEX NAME)



RN 127-63-9 HCA

35466-84-3 36560-81-3, Dinonyl carbonate  
(secondary **nonaq.-electrolyte battery**  
with **electrolyte** solvent contg. chain ester)

IT 77-77-0, Divinyl sulfone 96-48-0,  $\gamma$ -Butyrolactone  
96-49-1, Ethylene carbonate 108-32-7, Propylene carbonate  
872-36-6, Vinylene carbonate 1120-71-4, Propane sultone  
4427-96-7, Vinylethylene carbonate  
(solvent; secondary **nonaq.-electrolyte**  
**battery** with **electrolyte** solvent contg. chain  
ester)

L58 ANSWER 11 OF 33 HCA COPYRIGHT 2007 ACS on STN

139:9309 Organic **electrolyte** solutions and polymer  
**electrolytes** containing carbonates having carbon-carbon  
double bonds and secondary **lithium batteries**.

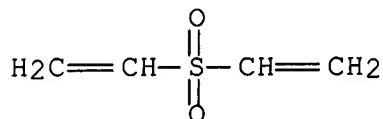
Oh, Wan-seok; Lee, Sang-won; Kim, Ko-sup; Choi, Sang-hoon (Samsung  
Sdi Co., Ltd., S. Korea). Jpn. Kokai Tokkyo Koho JP 2003163032 A  
20030606, 8 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP  
2002-257063 20020902. PRIORITY: KR 2001-56438 20010913.

AB The org. **electrolyte** solns. contain Li salt, **nonaq. org. solvent**, 0.01-6 wt.% (based on  
the total amt. of the solvent) ethylenically unsatd. compds. having b.p. 50-170°, and  
optionally 5-15 wt.% (based on the total amt. of the solvent) fluorobenzene. Polymer  
**electrolyte** comprising a polymer matrix contg. the said **electrolyte** solns. and secondary  
**lithium batteries** comprising the polymer **electrolytes** are also claimed. Expansion of  
the **batteries** due to gassing is prevented.

IT 77-77-0, Vinyl sulfone  
(**electrolyte** solns. contg. ethylenically unsatd.  
carbonates for use in secondary **lithium battery**  
polymer **electrolytes**)

RN 77-77-0 HCA

CN Ethene, 1,1'-sulfonylbis- (CA INDEX NAME)

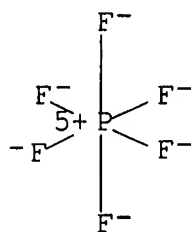


IT 21324-40-3, **Lithium** hexafluorophosphate

(electrolyte solns. contg. ethylenically unsatd.  
carbonates for use in secondary **lithium battery**  
polymer **electrolytes**)

RN 21324-40-3 HCA

CN Phosphate(1-), hexafluoro-, lithium (1:1) (CA INDEX NAME)



● Li<sup>+</sup>

IC ICM H01M010-40

ICS C07C069-96

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

Section cross-reference(s): 76

ST secondary **lithium battery** polymer

**electrolyte**; org **electrolyte** soln ethylenic compd;  
alkylene carbonate **electrolyte** soln

IT **Battery electrolytes**

**Electrolytic solutions**

(**electrolyte** solns. contg. ethylenically unsatd.  
carbonates for use in secondary **lithium battery**  
polymer **electrolytes**)

IT Fluoropolymers, uses

(**electrolyte** solns. contg. ethylenically unsatd.  
carbonates for use in secondary **lithium battery**  
polymer **electrolytes**)

IT Secondary **batteries**

(**lithium**; **electrolyte** solns. contg.  
ethylenically unsatd. carbonates for use in secondary  
**lithium battery** polymer **electrolytes**)

IT 77-77-0, Vinyl sulfone 107-13-1, Acrylonitrile, uses  
462-06-6, Fluorobenzene 872-36-6, Vinylene carbonate

(**electrolyte solns. contg. ethylenically unsatd.**  
carbonates for use in secondary **lithium battery**  
polymer **electrolytes**)

IT 9011-17-0, Hexafluoropropylene-vinylidene fluoride copolymer

**21324-40-3, Lithium hexafluorophosphate**  
(**electrolyte solns. contg. ethylenically unsatd.**  
carbonates for use in secondary **lithium battery**  
polymer **electrolytes**)

IT 96-49-1, Ethylene carbonate 105-58-8, Diethyl carbonate  
108-32-7, Propylene carbonate 616-38-6, Dimethyl carbonate  
623-53-0, Methylethyl carbonate  
(solvent; **electrolyte solns. contg. ethylenically**  
unsatd. carbonates for use in secondary **lithium**  
**battery polymer electrolytes**)

L58 ANSWER 12 OF 33 HCA COPYRIGHT 2007 ACS on STN

138:257909 **Nonaqueous electrolyte battery**

and **nonaqueous electrolytic solution**. Takami,  
Norio; Ishii, Haruchika (Kabushiki Kaisha Toshiba, Japan). U.S.  
Pat. Appl. Publ. US 2003059684 A1 20030327, 8 pp. (English).  
CODEN: USXXCO. APPLICATION: US 2002-233528 20020904. PRIORITY: JP  
2001-295004 20010926.

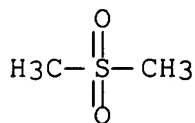
AB The present invention achieves an increased capacity and prolonged life of **nonaq.**  
**electrolyte batteries** of the type in which light metals, such as magnesium, calcium or  
aluminum, are used in the neg. electrode. The present invention also provides a  
thermally stable **nonaq. electrolytic soln.** for use with such **batteries**. The **nonaq.**  
**electrolyte battery** in accordance with the present invention includes a pos. electrode; a  
neg. electrode contg. at least one element selected from the group consisting of  
aluminum, calcium and magnesium; and a **nonaq. electrolytic soln.** composed of a  
mixed **solvent** of an **org. solvent** and an alkyl sulfone having a structure represented by  
R1R2SO2, where R1 and R2 are each independently an alkyl group, and at least one  
type of salt selected from the group consisting of aluminum salt, calcium salt and  
magnesium salt. The **org. solvent** is capable of dissolving the alkyl sulfone along with  
at least one type of salt selected from the group consisting of aluminum salt, calcium salt  
and magnesium salt.

IT 67-71-0, Dimethyl sulfone 39300-70-4,

**Lithium nickel oxide**  
(**nonaq. electrolyte battery and**  
**nonaq. electrolytic soln.**)

RN 67-71-0 HCA

CN Methane, 1,1'-sulfonylbis- (CA INDEX NAME)



RN 39300-70-4 HCA

CN Lithium nickel oxide (CA INDEX NAME)

Component	Ratio	Component
	Registry Number	
O	x	17778-80-2
Ni	x	7440-02-0
Li	x	7439-93-2

IC ICM H01M004-46

ICS H01M004-38; H01M010-40; H01M004-58; H01M004-52; H01M004-50;  
H01M004-48

INCL 429326000; 429231600; 429340000; 429329000; 429330000; 429231100;  
429224000; 429231300; 429231500; 429221000

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST **nonaq electrolyte battery**

IT Sulfones

(alkyl; **nonaq. electrolyte battery**  
and **nonaq. electrolytic soln.**)

IT Ethers, uses

(chain-like; **nonaq. electrolyte**  
**battery and nonaq. electrolytic**  
**soln.**)

IT Carbonates, uses

(cyclic and chain-like; **nonaq. electrolyte**  
**battery and nonaq. electrolytic**  
**soln.**)

IT Ethers, uses

(cyclic; **nonaq. electrolyte battery**  
and **nonaq. electrolytic soln.**)



- IT **Battery electrolytes**  
 Secondary batteries  
 (nonaq. electrolyte battery and  
 nonaq. electrolytic soln.)
- IT Carbon black, uses  
 (nonaq. electrolyte battery and  
 nonaq. electrolytic soln.)
- IT 25583-20-4, Titanium nitride  
 (coating; nonaq. electrolyte battery  
 and nonaq. electrolytic soln.)
- IT 67-71-0, Dimethyl sulfone 75-05-8, Acetonitrile, uses  
 96-48-0,  $\gamma$ -Butyrolactone 108-32-7, Propylene carbonate  
 594-43-4, Ethyl methyl sulfone 597-35-3, Diethyl sulfone  
 598-03-8, Dipropyl sulfone 1332-37-2, Iron oxide, uses  
 7429-90-5, Aluminum, uses 7429-90-5D, Aluminum, salt 7439-95-4,  
 Magnesium, uses 7439-95-4D, Magnesium, salt 7440-70-2, Calcium,  
 uses 7440-70-2D, Calcium, salt 7446-70-0, Aluminum chloride,  
 uses 7487-88-9, Magnesium sulfate, uses 7720-78-7, Ferrous  
 sulfate 7778-18-9, Calcium sulfate 7782-42-5, Graphite, uses  
 10028-22-5, Ferric sulfate 10034-81-8, Magnesium perchlorate  
 10043-01-3, Aluminum sulfate 10124-37-5, Calcium nitrate  
 10377-60-3, Magnesium nitrate 11099-11-9, Vanadium oxide  
 11129-60-5, Manganese oxide 12049-73-9, Calcium silicide  $\text{CaSi}$   
 13473-90-0, Aluminum nitrate 13477-36-6, Calcium perchlorate  
 13814-93-2, Calcium tetrafluoroborate 14403-54-4, Aluminum  
 tetrafluoroborate 14452-39-2, Aluminum perchlorate 14708-13-5,  
 Magnesium tetrafluoroborate 22831-39-6, Magnesium silicide  $\text{Mg}_2\text{Si}$   
 25152-52-7 **39300-70-4, Lithium nickel oxide**  
 39457-42-6, **Lithium Manganese oxide** 52627-24-4, Cobalt  
**lithium oxide** 55120-75-7, Calcium triflate 60871-83-2,  
 Magnesium triflate 74974-61-1, Aluminum triflate 78415-39-1,  
 Calcium hexafluorophosphate 88453-49-0, **Lithium**  
 heptachlorodialuminate(1-) 113359-60-7 502459-99-6 502460-01-7  
 502460-02-8  
 (nonaq. electrolyte battery and  
 nonaq. electrolytic soln.)

L58 ANSWER 13 OF 33 HCA COPYRIGHT 2007 ACS on STN  
 138:42046 Secondary **lithium battery**. Seki, Keiichi;  
 Kobayashi, Mitsuharu; Saito, Hiroyuki; Yamamoto, Masaki (Mitsubishi

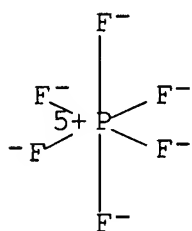
Chemical Corporation, Japan). PCT Int. Appl. WO 2002101869 A1  
**20021219**, 78 pp. DESIGNATED STATES: W: AE, AG, AL, AM, AT,  
 AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK,  
 DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS,  
 KE, KG, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW,  
 MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ,  
 TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW, AM, AZ, BY,  
 KG, KZ, MD, RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, CY,  
 DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT,  
 SE, SN, TD, TG, TR. (Japanese). CODEN: PIXXD2. APPLICATION: WO  
 2002-JP5656 20020607. PRIORITY: JP 2001-171851 20010607; JP  
 2001-179748 20010614; JP 2001-192635 20010626.

AB The **battery** has a cathode, an anode, and an **electrolyte** in a flexible **battery** case;  
 where the enthalpy difference between the neutral **nonaq. electrolyte** solvent mol. and it  
 monovalent anion radical, formed by adding an electron to the mol.,  $\Delta E_{sol}$  is greater  
 than the enthalpy difference between an additive in the **battery** and it monovalent anion  
 radical, formed by adding an electron to the mol.,  $\Delta E_{add}$ . The additive is preferably a  
 Lewis acid, e.g. a S compd. having a S:O bonding.

IT **21324-40-3, Lithium** hexafluorophosphate  
 (enthalpy difference between neutral mol. and monovalent anion  
 radical of solvent and additive in **electrolytes** for  
 secondary **lithium batteries**)

RN 21324-40-3 HCA

CN Phosphate(1-), hexafluoro-, lithium (1:1) (CA INDEX NAME)



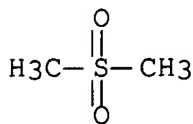
●  $Li^+$

IT **67-71-0, Dimethyl sulfone**  
 (enthalpy difference between neutral mol. and monovalent anion  
 radical of solvent and additive in **electrolytes** for

secondary **lithium batteries**)

RN 67-71-0 HCA

CN Methane, 1,1'-sulfonylbis- (CA INDEX NAME)



IC ICM H01M010-40

ICS H01M004-58; H01M004-62; H01M004-02; H01M002-02

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST secondary **lithium battery** sulfur compd additive

enthalpy; **electrolyte** solvent enthalpy secondary  
**lithium battery**

IT **Battery electrolytes**

Enthalpy

(enthalpy difference between neutral mol. and monovalent anion  
radical of solvent and additive in **electrolytes** for  
secondary **lithium batteries**)

IT **Secondary batteries**

(**lithium**; enthalpy difference between neutral mol. and  
monovalent anion radical of solvent and additive in  
**electrolytes** for secondary **lithium**  
**batteries**)

IT 21324-40-3, **Lithium** hexafluorophosphate

(enthalpy difference between neutral mol. and monovalent anion  
radical of solvent and additive in **electrolytes** for  
secondary **lithium batteries**)

IT 64-67-5, Diethyl sulfate 66-27-3, Methyl methanesulfonate

67-68-5, Dimethyl sulfoxide, uses 67-71-0, Dimethyl

sulfone 96-49-1, Ethylene carbonate 108-32-7, Propylene

carbonate 126-33-0, Sulfolane 616-42-2, Dimethyl sulfite

1120-71-4, 1,3-Propanesultone 1600-44-8, Tetramethylene sulfoxide

3741-38-6, Ethylene sulfite 478784-91-7, Ethylene glycol sulfate

(enthalpy difference between neutral mol. and monovalent anion  
radical of solvent and additive in **electrolytes** for  
secondary **lithium batteries**)

L58 ANSWER 14 OF 33 HCA COPYRIGHT 2007 ACS on STN

137:339972 **Nonaqueous electrolyte** containing

**nonaqueous solvents and nonaqueous**

**electrolyte secondary battery** using the same for

suppression of gas generation during high-temperature storage and

charging/discharging processes. Sekino, Masahiro; Sato, Asako;

Fujiwara, Masashi; Monma, Shun; Hasebe, Hiroyuki (Toshiba Corp.,

Japan). Jpn. Kokai Tokkyo Koho JP 2002313418 A **20021025**,

18 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 2001-110918

20010410.

AB The **nonaq. electrolyte** comprises a Li salt dissolved in a **nonaq.** solvent, wherein the **nonaq.** solvent is made up of ethylene carbonate (EC), propylene carbonate (PC),  $\gamma$ -butyrolactone (BL), and  $\geq 1$  4th component selected from diglycolic acid anhydride, 2-sulfobenzoic acid anhydride, and divinylsulfone so as to satisfy  $15 \leq x \leq 50$ ,  $2 \leq y \leq 35$ ,  $30 \leq z \leq 85$ ,

and  $0 < p \leq 4$  (x, y z and p are vo.% of EC, PC, BL, and 4th component, resp.).

IT **14283-07-9 21324-40-3, Lithium**

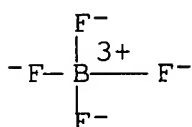
hexafluorophosphate

(**electrolyte** used for Li secondary

**battery**)

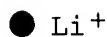
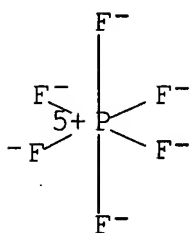
RN 14283-07-9 HCA

CN Borate(1-), tetrafluoro-, lithium (1:1) (CA INDEX NAME)

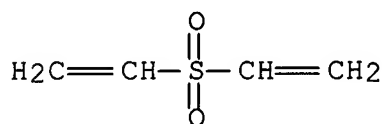


RN 21324-40-3 HCA

CN Phosphate(1-), hexafluoro-, lithium (1:1) (CA INDEX NAME)



IT 77-77-0, Divinylsulfone  
 (solvent in **nonaq. electrolyte** used for  
**Li secondary battery**)  
 RN 77-77-0 HCA  
 CN Ethene, 1,1'-sulfonylbis- (CA INDEX NAME)



IC ICM H01M010-40  
 ICS H01M010-40; H01M002-02  
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
 ST **nonaq electrolyte lithium salt**  
 solvent; **lithium nonaq secondary battery**  
 solvent  
 IT **Secondary batteries**  
 (lithium; solvent in **nonaq.**  
**electrolyte** used for **Li secondary**  
**battery**)  
 IT **Battery electrolytes**  
 (solvent in **nonaq. electrolyte** used for  
**Li secondary battery**)  
 IT 14283-07-9 21324-40-3, **Lithium**  
**hexafluorophosphate**

(electrolyte used for Li secondary battery)

IT 77-77-0, Divinylsulfone 96-48-0,  $\gamma$ -Butyrolactone  
96-49-1, Ethylene carbonate 108-32-7, Propylene carbonate  
110-99-6, Diglycolic acid 632-25-7, 2-Sulfobenzoic acid  
(solvent in **nonaq. electrolyte** used for  
Li secondary battery)

L58 ANSWER 15 OF 33 HCA COPYRIGHT 2007 ACS on STN

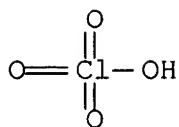
137:188305 **Nonaqueous secondary battery** having  
enhanced discharge capacity retention. Hamamoto, Toshikazu; Abe,  
Koji; Takai, Tsutomu; Matsumori, Yasuo; Ueki, Akira (Ube Industries,  
Ltd., Japan). U.S. Pat. Appl. Publ. US 2002122988 A1  
**20020905**, 13 pp., Cont.-in-part of U.S. Ser. No. 631,518.  
(English). CODEN: USXXCO. APPLICATION: US 2001-21130 20011022.  
PRIORITY: JP 1999-219708 19990803; US 2000-631518 20000803; JP  
2000-321146 20001020; JP 2000-335946 20001102; JP 2000-363656  
20001129.

AB The discharge capacity retention of a **nonaq. secondary battery** is enhanced by  
incorporating into its **nonaq. electrolytic soln.** a small amt. of a substituted  
diphenyldisulfide deriv. in which each of the di-Ph groups has a substituent such as  
alkoxy, alkenyloxy, alkynyloxy, cycloalkyloxy, aryloxy, acyloxy, alkanesulfonyloxy,  
arylsulfonyloxy, alkoxycarbonyloxy, aryloxycarbonyloxy, halogen, CF<sub>3</sub>, CCl<sub>3</sub>, or CBr<sub>3</sub>.  
Preferably, a small amt. of Me 2-propylcarbonate, 2-propynyl methanesulfonate, 1,3-  
propanesultone, divinylsulfone, 1,4-butanediol dimethanesulfonate or  
cyclohexylbenzene is further incorporated.

IT 7791-03-9, **Lithium perchlorate 14283-07-9**  
, **Lithium tetrafluoroborate 21324-40-3**,  
**Lithium hexafluorophosphate 90076-65-6**  
(**nonaq. secondary battery** having enhanced  
discharge capacity retention)

RN 7791-03-9 HCA

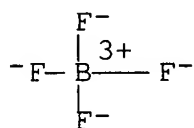
CN Perchloric acid, lithium salt (1:1) (CA INDEX NAME)



● Li

RN 14283-07-9 HCA

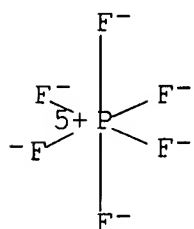
CN Borate(1-), tetrafluoro-, lithium (1:1) (CA INDEX NAME)



● Li<sup>+</sup>

RN 21324-40-3 HCA

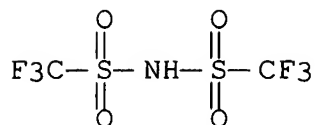
CN Phosphate(1-), hexafluoro-, lithium (1:1) (CA INDEX NAME)



● Li<sup>+</sup>

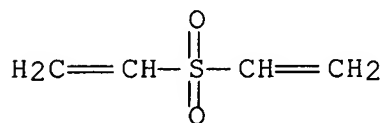
RN 90076-65-6 HCA

CN Methanesulfonamide, 1,1,1-trifluoro-N-[(trifluoromethyl)sulfonyl]-,  
lithium salt (1:1) (CA INDEX NAME)



● Li

IT 77-77-0, Divinylsulfone  
 (nonaq. secondary battery having enhanced  
 discharge capacity retention)  
 RN 77-77-0 HCA  
 CN Ethene, 1,1'-sulfonylbis- (CA INDEX NAME)



IC ICM H01M010-40  
 INCL 429340000  
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
 ST battery electrolyte additive substituted  
 diphenyldisulfide deriv  
 IT Secondary batteries  
 (lithium; nonaq. secondary battery  
 having enhanced discharge capacity retention)  
 IT Battery electrolytes  
 (nonaq. secondary battery having enhanced  
 discharge capacity retention)  
 IT 68-12-2, Dmf, uses 75-05-8, Acetonitrile, uses 96-47-9,  
 2-Methyltetrahydrofuran 96-48-0,  $\gamma$ -Butyrolactone 96-49-1,  
 Ethylene carbonate 105-58-8, Diethyl carbonate 108-32-7,  
 Propylene carbonate 109-99-9, Tetrahydrofuran, uses 110-71-4,  
 1,2-Dimethoxyethane 112-48-1, 1,2-Dibutoxyethane 123-91-1,



1,4-Dioxane, uses 539-92-4, Diisobutyl carbonate 554-12-1, Methyl propionate 616-38-6, Dimethyl carbonate 623-53-0, Ethyl methyl carbonate 629-14-1, 1,2-Diethoxyethane 872-36-6, Vinylene carbonate 4437-85-8, Butylene carbonate 6482-34-4, Diisopropyl carbonate 7782-42-5, Graphite, uses 7791-03-9, Lithium perchlorate 12190-79-3, Cobalt lithium oxide colio2 14283-07-9, Lithium tetrafluoroborate 21324-40-3, Lithium hexafluorophosphate 85213-04-3, Carbonic acid, methyl 2-methylpropyl ester 90076-65-6 132404-42-3 132843-44-8 205926-54-1 205926-56-3 365454-70-2 365460-35-1 403699-22-9

(nonaq. secondary battery having enhanced discharge capacity retention)

IT 51729-83-0, Isopropyl methyl carbonate (nonaq. secondary battery having enhanced discharge capacity retention)

IT 55-98-1, 1,4-Butanediol dimethanesulfonate 77-77-0, Divinylsulfone 405-31-2, Bis(4-fluorophenyl)disulfide 827-52-1, Cyclohexylbenzene 1120-71-4, 1,3-Propanesultone 1142-19-4, Bis(4-chlorophenyl)disulfide 5335-87-5, Bis(4-methoxyphenyl)disulfide 12057-17-9, Lithium manganese oxide  $\text{LiMn}_2\text{O}_4$  16156-58-4, 2-Propynyl methanesulfonate 18715-45-2 31121-13-8, Bis(4-ethoxyphenyl)disulfide 61764-71-4, Methyl 2-propynyl carbonate 107014-69-7 113066-89-0, Cobalt lithium nickel oxide  $\text{Co}_{0.2}\text{LiNi}_{0.8}\text{O}_2$  326921-47-5 326921-48-6

(nonaq. secondary battery having enhanced discharge capacity retention)

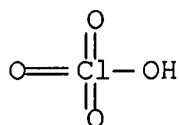
L58 ANSWER 16 OF 33 HCA COPYRIGHT 2007 ACS on STN 136:328190 Nonaqueous secondary battery having enhanced discharge capacity retention. Abe, Koji; Ueki, Akira; Hamamoto, Toshikazu (Ube Industries, Ltd., Japan). Eur. Pat. Appl. EP 1199766 A2 20020424, 15 pp. DESIGNATED STATES: R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR. (English). CODEN: EPXXDW. APPLICATION: EP 2001-124312 20011019. PRIORITY: JP 2000-321146 20001020; JP 2000-335946 20001102; JP 2000-363656 20001129.

AB A discharge capacity retention of a **nonaq.** secondary **battery** is enhanced by incorporating into its **nonaq. electrolytic soln.** a small amt. of a substituted diphenyldisulfide deriv. in which each of the di-Ph groups has a substituent such as alkoxy, alkenyloxy, alkynyloxy, cycloalkyloxy, aryloxy, acyloxy, alkanesulfonyloxy, arylsulfonyloxy, alkoxycarbonyloxy, aryloxycarbonyloxy, halogen, CF<sub>3</sub>, CCl<sub>3</sub>, or CBr<sub>3</sub>. Preferably, a small amt. of Me 2-propylcarbonate, 2-propynyl methanesulfonate, 1,3-propanesultone, divinylsulfone, 1,4-butanediol dimethanesulfonate or cyclohexylbenzene is further incorporated.

IT 7791-03-9, **Lithium** perchlorate 14283-07-9  
 , **Lithium** tetrafluoroborate 21324-40-3,  
**Lithium** hexafluorophosphate 90076-65-6  
 (**nonaq.** secondary **battery** having enhanced  
 discharge capacity retention)

RN 7791-03-9 HCA

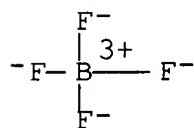
CN Perchloric acid, lithium salt (1:1) (CA INDEX NAME)



● Li

RN 14283-07-9 HCA

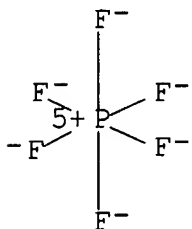
CN Borate(1-), tetrafluoro-, lithium (1:1) (CA INDEX NAME)



● Li<sup>+</sup>

RN 21324-40-3 HCA

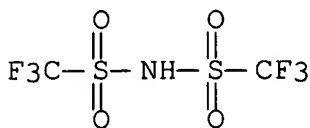
CN Phosphate(1-), hexafluoro-, lithium (1:1) (CA INDEX NAME)



● Li<sup>+</sup>

RN 90076-65-6 HCA

CN Methanesulfonamide, 1,1,1-trifluoro-N-[(trifluoromethyl)sulfonyl]-,  
lithium salt (1:1) (CA INDEX NAME)



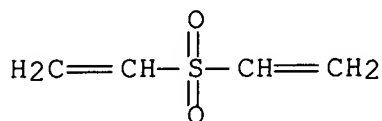
● Li

IT 77-77-0, Divinylsulfone

(**nonaq.** secondary **battery** having enhanced  
discharge capacity retention)

RN 77-77-0 HCA

CN Ethene, 1,1'-sulfonylbis- (CA INDEX NAME)



IC ICM H01M010-40

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST **battery secondary nonaq electrolyte**

IT **Battery electrolytes**

Secondary batteries

(**nonaq.** secondary **battery** having enhanced  
discharge capacity retention)

IT 68-12-2, Dmf, uses 75-05-8, Acetonitrile, uses 96-47-9,  
2-Methyltetrahydrofuran 96-48-0,  $\gamma$ -Butyrolactone 96-49-1,  
Ethylene carbonate 105-58-8, Diethyl carbonate 108-32-7,  
Propylene carbonate 109-99-9, Thf, uses 110-71-4,  
1,2-Dimethoxyethane 112-48-1, 1,2-Dibutoxyethane 123-91-1,  
1,4-Dioxane, uses 539-92-4, Diisobutyl carbonate 554-12-1,  
Methyl propionate 616-38-6, Dimethyl carbonate 623-53-0, Methyl  
ethyl carbonate 629-14-1, 1,2-Diethoxyethane 872-36-6, Vinylene  
carbonate 4437-85-8, Butylene carbonate 6482-34-4, Diisopropyl  
carbonate 7782-42-5, Graphite, uses **7791-03-9**,  
**Lithium** perchlorate 12190-79-3, Cobalt **lithium**  
oxide colio2 **14283-07-9**, **Lithium**  
tetrafluoroborate **21324-40-3**, **Lithium**  
hexafluorophosphate 85213-04-3, Carbonic acid, methyl  
(2-methylpropyl) ester **90076-65-6** 113066-89-0, Cobalt  
**lithium** nickel oxide  $\text{Co}_{0.2}\text{LiNi}_{0.8}\text{O}_2$  132404-42-3  
132843-44-8 205926-54-1 205926-56-3 365454-70-2 365460-35-1  
403699-22-9

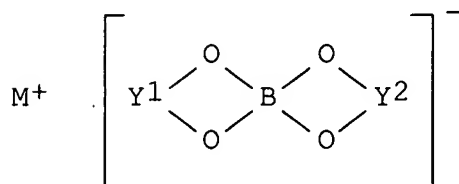
(**nonaq.** secondary **battery** having enhanced  
discharge capacity retention)

IT 55-98-1, 1,4-Butanediol dimethanesulfonate **77-77-0**,  
Divinylsulfone 827-52-1, Cyclohexylbenzene 882-33-7D,  
Diphenyldisulfide, substituted deriv. 1120-71-4,  
1,3-Propanesultone 1142-19-4, Bis(4-chlorophenyl)disulfide  
5335-87-5, Bis(4-methoxyphenyl)disulfide 13153-11-2,  
1,3-Propanesulfone 16156-58-4, 2-Propynyl methanesulfonate  
31121-13-8, Bis(4-ethoxyphenyl)disulfide 51729-83-0, Methyl  
isopropyl carbonate 61764-71-4, Methyl 2-propynylcarbonate  
64923-50-8, 1,3-Butanediol dimethanesulfonate

(**nonaq.** secondary **battery** having enhanced  
discharge capacity retention)

136:56441 **Electrolytic high conductivity salts for lithium secondary batteries.** Angell, Charles A.; Xu, Wu (Arizona Board of Regents, USA). PCT Int. Appl. WO 2001099209 A2 20011227, 28 pp. DESIGNATED STATES: W: CA, JP, KR, US; RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR. (English). CODEN: PIXXD2. APPLICATION: WO 2001-US19359 20010618. PRIORITY: US 2000-PV212231 20000616; US 2001-PV290864 20010514.

GI

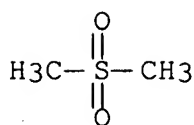


AB Orthoborate salts suitable for use as **electrolytes in lithium batteries** and methods for making the **electrolyte** salts are provided. The **electrolytic** salts have one of the formulas (I). In this formula anionic ortho-borate groups are capped with two bidentate chelating groups, Y1 and Y2. Certain preferred chelating groups are dibasic acid residues, most preferably oxalyl, malonyl and succinyl, disulfonic acid residues, sulfoacetic acid residues and halo-substituted alkylenes. The salts are sol. in **nonaq.** solvents and polymeric gels and are useful components of **lithium batteries** in electrochem. devices.

IT 67-71-0, Dimethylsulfone  
(**electrolytic high cond. salts for lithium secondary batteries**)

RN 67-71-0 HCA

CN Methane, 1,1'-sulfonylbis- (CA INDEX NAME)



IC ICM H01M

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

Section cross-reference(s): 29

ST **lithium battery electrolyte high cond**  
**salt; borate salt electrolyte lithium**  
**battery**

IT **Battery electrolytes**  
 Conducting polymers  
 Electric conductivity  
 (**electrolytic high cond. salts for lithium**  
**secondary batteries**)

IT **Secondary batteries**  
 (**lithium; electrolytic high cond. salts for**  
**lithium secondary batteries**)

IT 7439-93-2, **Lithium**, uses 9011-14-7, Pmma 198195-76-5,  
 Chromium **lithium** manganese oxide  $\text{Cr}_{0.02}\text{LiMn}_{1.98}\text{O}_4$   
 (**electrolytic high cond. salts for lithium**  
**secondary batteries**)

IT 290827-01-9 383187-21-1 383187-36-8 383187-41-5  
 (**electrolytic high cond. salts for lithium**  
**secondary batteries**)

IT 244761-29-3P 291298-96-9P 383187-24-4P 383187-29-9P  
 (**electrolytic high cond. salts for lithium**  
**secondary batteries**)

IT 6867-35-2P 18294-04-7P  
 (**electrolytic high cond. salts for lithium**  
**secondary batteries**)

IT 67-68-5, DmsO, uses 67-71-0, Dimethylsulfone 96-48-0,  
 $\gamma$ -Butyrolactone 96-49-1, Ethylene carbonate 105-58-8,  
 Diethyl carbonate 108-32-7, Propylene carbonate 110-71-4,  
 1,2-Dimethoxyethane 594-43-4, Ethyl methyl sulfone 616-38-6,  
 Dimethyl carbonate 629-14-1, 1,2-Diethoxyethane 4437-85-8,  
 Butylene carbonate

(electrolytic high cond. salts for **lithium**  
secondary **batteries**)

L58 ANSWER 18 OF 33 HCA COPYRIGHT 2007 ACS on STN

135:109752 **Electrolyte** for **lithium** secondary

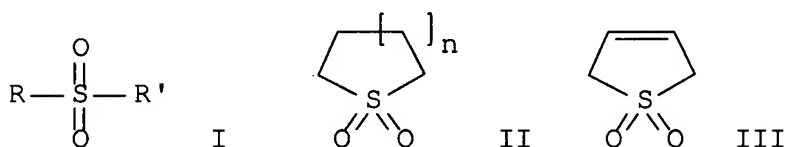
**battery**. Kim, Jin-sung; Lee, Jong-wook; Kim, Kwang-sik;

Kim, Young-gyu; Kim, Je-yun; Kim, Jong-seob (S. Korea). U.S. Pat.

Appl. Publ. US 20010009744 A1 **20010726**, 7 pp. (English).

CODEN: USXXCO. APPLICATION: US 2001-766520 20010119. PRIORITY: KR  
2000-2947 20000121; KR 2000-81253 20001223.

GI

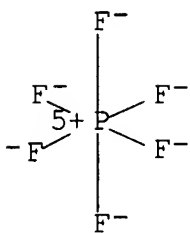


AB The title **electrolyte** includes a **nonaq.** solvent and a sulfone based org. compd. represented as in the following formulas (I), (II), or (III), or a mixt. thereof: where R and R' are independently selected from the group consisting of a primary, secondary, or tertiary alkyl group, alkenyl group, and aryl group; and a substituted primary, secondary, or tertiary alkyl group, alkenyl group, and aryl group, and  $n$  is from 0 to 3.

IT **21324-40-3, Lithium** hexafluorophosphate  
(sulfone based org. compd. contg. **electrolyte** for  
**lithium** secondary **battery**)

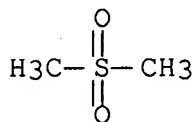
RN 21324-40-3 HCA

CN Phosphate(1-), hexafluoro-, lithium (1:1) (CA INDEX NAME)

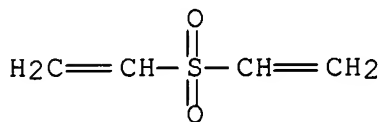


● Li<sup>+</sup>

IT 67-71-0, Methyl sulfone 77-77-0, Vinyl sulfone  
 127-63-9, Phenyl sulfone 620-32-6, Benzyl sulfone  
 (sulfone based org. compd. contg. **electrolyte** for  
**lithium secondary battery**)  
 RN 67-71-0 HCA  
 CN Methane, 1,1'-sulfonylbis- (CA INDEX NAME)

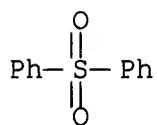


RN 77-77-0 HCA  
 CN Ethene, 1,1'-sulfonylbis- (CA INDEX NAME)



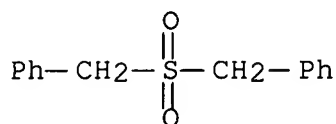
RN 127-63-9 HCA  
 CN Benzene, 1,1'-sulfonylbis- (CA INDEX NAME)





RN 620-32-6 HCA

CN Benzene, 1,1'-[sulfonylbis(methylene)]bis- (CA INDEX NAME)



IC ICM H01M006-16

ICS H01M010-40

INCL 429326000

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST **lithium battery electrolyte sulfone**  
based org compd

IT Transition metal oxides  
(**lithiated**; sulfone based org. compd. contg.  
**electrolyte for lithium secondary**  
**battery**)

IT Secondary batteries  
(**lithium**; sulfone based org. compd. contg.  
**electrolyte for lithium secondary**  
**battery**)

IT **Battery electrolytes**  
(sulfone based org. compd. contg. **electrolyte for**  
**lithium secondary battery**)

IT Sulfones  
(sulfone based org. compd. contg. **electrolyte for**  
**lithium secondary battery**)

IT **Lithium alloy, base**  
(sulfone-based org. compd. contg. **electrolyte for**  
**lithium secondary battery**)

IT 96-49-1, Ethylene carbonate 616-38-6, Dimethyl carbonate  
7439-93-2, **Lithium**, uses 12190-79-3, cobalt  
**lithium** oxide colio2 21324-40-3, **Lithium**  
hexafluorophosphate

(sulfone based org. compd. contg. **electrolyte** for  
**lithium** secondary **battery**)

IT 67-71-0, Methyl sulfone 77-77-0, Vinyl sulfone  
126-33-0, Tetramethylene sulfone 127-63-9, Phenyl sulfone  
383-29-9, 4-FluoroPhenyl sulfone 620-32-6, Benzyl sulfone  
28452-93-9, Butadiene sulfone  
(sulfone based org. compd. contg. **electrolyte** for  
**lithium** secondary **battery**)

L58 ANSWER 19 OF 33 HCA COPYRIGHT 2007 ACS on STN

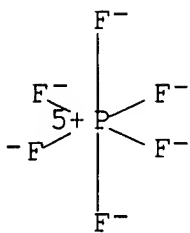
135:95152 **Nonaqueous-electrolyte** solution containing  
organic additive and **battery** using it. Yamada, Kazuhiro;  
Saito, Toshiya; Taki, Takayuki; Asano, Satoshi; Takatsuna, Kazutoshi  
(Tonen Chemical Corp., Japan). Jpn. Kokai Tokkyo Koho JP 2001185212  
A 20010706, 8 pp. (Japanese). CODEN: JKXXAF.  
APPLICATION: JP 1999-364694 19991222.

AB The **electrolyte** soln. contains  $\geq 1$  of compd. selected from thioalkylene group-contg.  
organosilicon compd., dialkoxysilane compd., trialkoxysilane compd., pyrrole and its  
deriv., pyrrolidone and its deriv., pyrrolidine and its deriv., N-contg. onium salt, S-contg.  
onium salt, P-contg. onium salt, unsatd. hydrocarbon-contg. sulfone compd.,  
dialkylsulfide compd., cyclic compd. contg.  $\geq 3$  of S atoms, diketone compd., acrylate  
ester, methacrylate ester, carbazate compd., epoxy compd., alkenyl group-contg.  
oxolane, and phosphite. A **nonaq. battery** using the above **electrolyte** soln. is also  
claimed. The **electrolyte** soln. shows low irreversible capacity by preventing decompn.  
of solvents and the **battery** provides long cycle life.

IT 21324-40-3, **Lithium** hexafluorophosphate  
(**electrolyte**; **nonaq.-electrolyte**  
soln. contg. org. additive for **battery** having long  
cycle life)

RN 21324-40-3 HCA

CN Phosphate(1-), hexafluoro-, lithium (1:1). (CA INDEX NAME)



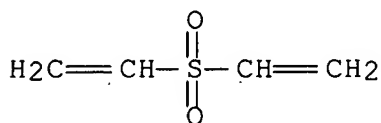
● Li<sup>+</sup>

IT 77-77-0

(**nonaq.-electrolyte** soln. contg. org.  
additive for **battery** having long cycle life)

RN 77-77-0 HCA

CN Ethene, 1,1'-sulfonylbis- (CA INDEX NAME)



IC ICM H01M010-40

ICS H01M006-16

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST **nonaq electrolyte** soln additive **battery**

IT Ketones, uses

(diketones; **nonaq.-electrolyte** soln. contg.  
org. additive for **battery** having long cycle life)

IT Secondary **batteries**

(**lithium**; **nonaq.-electrolyte** soln.  
contg. org. additive for **battery** having long cycle  
life)

IT **Battery electrolytes**

(**nonaq.-electrolyte** soln. contg. org.  
additive for **battery** having long cycle life)

IT Epoxides

Phosphonium compounds

Quaternary ammonium compounds, uses

Sulfonium compounds

(**nonaq.-electrolyte** soln. contg. org.  
additive for **battery** having long cycle life)

IT 21324-40-3, **Lithium** hexafluorophosphate  
(**electrolyte**; **nonaq.-electrolyte**  
soln. contg. org. additive for **battery** having long  
cycle life)

IT 77-77-0 88-12-0, uses 96-33-3, Methyl acrylate  
106-92-3, Allyl glycidyl ether 109-97-7, Pyrrole 122-52-1  
123-54-6, 2,4-Pentanedione, uses 352-93-2 429-06-1 616-45-5,  
Pyrrolidone 665-49-6 872-50-4, N-Methylpyrrolidone, uses  
930-35-8, 1,3-Dithiole-2-thione 2768-02-7 3984-22-3 4420-74-0  
6294-89-9 16881-77-9 18165-76-9 345270-09-9  
(**nonaq.-electrolyte** soln. contg. org.  
additive for **battery** having long cycle life)

IT 96-48-0,  $\gamma$ -Butyrolactone 96-49-1, Ethylene carbonate  
108-32-7, Propylene carbonate 616-38-6, Dimethyl carbonate  
(solvent; **nonaq.-electrolyte** soln. contg.  
org. additive for **battery** having long cycle life)

L58 ANSWER 20 OF 33 HCA COPYRIGHT 2007 ACS on STN

134:195752 **Nonaqueous electrolyte** solution and

secondary **lithium battery** using it. Hinohara,

Akio (Mitsui Chemicals Inc., Japan). Jpn. Kokai Tokkyo Koho JP

2001057234 A 20010227, 8 pp. (Japanese). CODEN: JKXXAF.

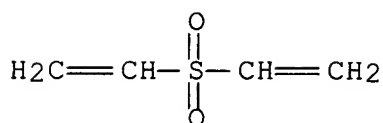
APPLICATION: JP 1999-232211 19990819.

AB The soln. contg. **nonaq.** solvents and **Li** salts shows leak current value 0.25  $\mu$ A/mg-graphite obsd. by **Li** -graphite **battery** in **nonaq. electrolyte** soln. (3 g per 1 g graphite electrode) at 60° and 1 V for 25 h. The soln. may contain cyclic and/or linear carbonate esters and a compd. which become slightly sol. at **electrolysis**. The **battery** contains a **Li**-doping/dedoping carbon anode, a cathode, and the above soln. The **battery** shows long cycle life and storage stability at high temp.

IT 77-77-0, Divinyl sulfone  
(**nonaq. electrolyte** soln. for secondary  
**lithium battery** with long cycle life)

RN 77-77-0 HCA

CN Ethene, 1,1'-sulfonylbis- (CA INDEX NAME)



IC ICM H01M010-40

ICS H01M004-58

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST **nonaq electrolyte soln leak current**

**lithium battery**

IT Secondary batteries

(**lithium; nonaq. electrolyte soln.**

for secondary **lithium battery** with long cycle life)

IT 96-49-1, Ethylene carbonate 616-38-6, Dimethyl carbonate

(**nonaq. electrolyte soln. for secondary**

**lithium battery** with long cycle life)

IT 77-77-0, Divinyl sulfone 85-44-9, Phthalic anhydride

108-31-6, Maleic anhydride, uses 2904-41-8, Tris(carboxyethyl)

isocyanurate 4427-96-7, Vinylethylene carbonate 15896-04-5

40220-08-4, Tris(acryloyloxyethyl) isocyanurate 327181-13-5

(**nonaq. electrolyte soln. for secondary**

**lithium battery** with long cycle life)

L58 ANSWER 21 OF 33 HCA COPYRIGHT 2007 ACS on STN

134:165674 **Nonaqueous electrolyte solutions and**

secondary **lithium batteries** using the

**electrolyte solutions.** Hamamoto, Shunichi; Ueki, Akira;

Abe, Hiroshi; Matsumori, Yasuo (Ube Industries, Ltd., Japan). Jpn.

Kokai Tokyo Koho JP 2001043895 A 20010216, 8 pp.

(Japanese). CODEN: JKXXAF. APPLICATION: JP 2000-116327 20000418.

PRIORITY: JP 1999-143222 19990524.

AB The **electrolyte solns.** contain a cyclic and linear carbonate ester based solvent mixt., with the difference between the highest and the lowest redn. potentials of mixt. components smaller 0.4V. Preferably, the **electrolyte solns.** contain 0.1-4% 1,3-propanesultone and/or 0.1-4% 1,4-butanedisultone and 0.1-4% vinyl carbonate.

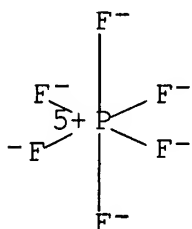
IT 21324-40-3, **Lithium hexafluorophosphate**

(**nonaq. electrolyte solns.** with controlled

redn. p.d. among solvent components for secondary **lithium batteries**)

RN 21324-40-3 HCA

CN Phosphate(1-), hexafluoro-, lithium (1:1) (CA INDEX NAME)



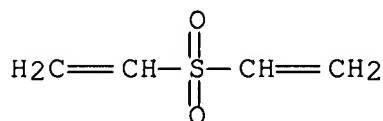
● Li<sup>+</sup>

IT 77-77-0, Divinylsulfone

(nonaq. electrolyte solns. with controlled  
redn. p.d. among solvent components for secondary **lithium batteries**)

RN 77-77-0 HCA

CN Ethene, 1,1'-sulfonylbis- (CA INDEX NAME)



IC ICM H01M010-40

ICS H01M004-58

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST secondary **lithium battery electrolyte**

solvent redn potential; propanesultone vinyl carbonate

**lithium battery electrolyte solvent;**

butanesultone vinyl carbonate **lithium battery electrolyte solvent**

IT **Battery electrolytes**

(**nonaq. electrolyte solns.** with controlled redn. p.d. among solvent components for secondary **lithium batteries**)

IT 21324-40-3, **Lithium hexafluorophosphate** (**nonaq. electrolyte solns.** with controlled redn. p.d. among solvent components for secondary **lithium batteries**)

IT 55-98-1, 1,4-Butanediol dimethanesulfonate 77-77-0, Divinylsulfone 96-49-1, Ethylene carbonate 105-58-8, Diethyl carbonate 108-32-7, Propylene carbonate 536-74-3, Phenylacetylene 616-38-6, Dimethyl carbonate 623-53-0, Methyl ethyl carbonate 872-36-6, Vinylene carbonate 1120-71-4, 1,3-Propanesultone 1633-83-6, 1,4-Butanesultone 4672-49-5, Ethylene glycol dimethanesulfonate 51729-83-0, Methyl iso-propyl carbonate 61764-71-4, Methyl propargyl carbonate 325477-87-0 (**nonaq. electrolyte solns.** with controlled redn. p.d. among solvent components for secondary **lithium batteries**)

L58 ANSWER 22 OF 33 HCA COPYRIGHT 2007 ACS on STN

134:118407 **Nonaqueous electrolyte solutions and secondary lithium batteries** using the solutions.

Hamamoto, Shunichi; Abe, Hiroshi; Takai, Tsutomu; Matsumori, Yasuo (Ube Industries, Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 2001023688

A 20010126, 5 pp. (Japanese). CODEN: JKXXAF.

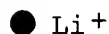
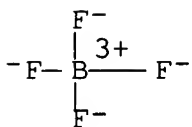
APPLICATION: JP 1999-198351 19990713.

AB The **electrolyte solns.** contain LiBF<sub>4</sub> dissolved in a cyclic carbonate ester and cyclic ester based solvent mixt., and contain vinyl sulfone derivs. RSO<sub>2</sub>CH:CH<sub>2</sub>, where R = C1-12 alkyl, C2-12 alkenyl, or C3-6 cycloalkyl groups.

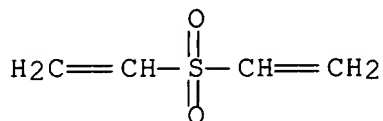
IT 14283-07-9, **Lithium fluoroborate** (**Nonaq. electrolyte solns.** and secondary **lithium batteries** using the solns.)

RN 14283-07-9 HCA

CN Borate(1-), tetrafluoro-, lithium (1:1) (CA INDEX NAME)



IT 77-77-0, Divinyl sulfone  
 (Nonaq. electrolyte solns. and secondary  
 lithium batteries using the solns.)  
 RN 77-77-0 HCA  
 CN Ethene, 1,1'-sulfonylbis- (CA INDEX NAME)



IC ICM H01M010-40  
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
 ST secondary lithium battery electrolyte  
 vinyl sulfone deriv  
 IT Battery electrolytes  
 (Nonaq. electrolyte solns. and secondary  
 lithium batteries using the solns.)  
 IT 96-48-0,  $\gamma$ -Butyrolactone 96-49-1, Ethylene carbonate  
 14283-07-9, Lithium fluoroborate  
 (Nonaq. electrolyte solns. and secondary  
 lithium batteries using the solns.)  
 IT 77-77-0, Divinyl sulfone 1889-59-4, Ethyl vinyl sulfone  
 (Nonaq. electrolyte solns. and secondary  
 lithium batteries using the solns.)



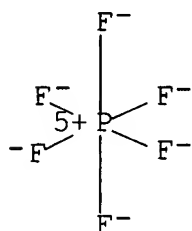
secondary **batteries**. Suzuki, Emi; Watanuki, Yusuke;  
 Rokkaku, Takahiro; Kojima, Tetsuo; Ueda, Satao; Nakano, Minoru  
 (Toyama Chemical Industry Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho  
 JP 2000348763 A **20001215**, 5 pp. (Japanese). CODEN:  
 JKXXAF. APPLICATION: JP 1999-160211 19990607.

AB **Nonaq. electrolyte solns.**, for secondary **Li batteries** using carbonaceous anodes,  
 contain a **Li salt electrolyte** and di-Ph sulfone or, its derivs. having halogen or alkyl  
 group substituents at the p-positions, preferably at 0.1-10%.

IT **21324-40-3, Lithium hexafluorophosphate**  
 (nonaq. electrolyte solns. contg. di-Ph  
 sulfone derivs. for secondary **lithium batteries**  
 )

RN 21324-40-3 HCA

CN Phosphate(1-), hexafluoro-, lithium (1:1) (CA INDEX NAME)

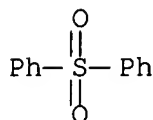


● Li<sup>+</sup>

IT **127-63-9, Diphenyl sulfone**  
 (nonaq. electrolyte solns. contg. di-Ph  
 sulfone derivs. for secondary **lithium batteries**  
 )

RN 127-63-9 HCA

CN Benzene, 1,1'-sulfonylbis- (CA INDEX NAME)



IC ICM H01M010-40

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST secondary **lithium battery electrolyte**

soln diphenyl sulfone

IT **Battery electrolytes**

(**nonaq. electrolyte** solns. contg. di-Ph

sulfone derivs. for secondary **lithium batteries**

)

IT 96-49-1, Ethylene carbonate 105-58-8, Diethyl carbonate

**21324-40-3, Lithium hexafluorophosphate**

(**nonaq. electrolyte** solns. contg. di-Ph

sulfone derivs. for secondary **lithium batteries**

)

IT **127-63-9, Diphenyl sulfone**

(**nonaq. electrolyte** solns. contg. di-Ph

sulfone derivs. for secondary **lithium batteries**

)

L58 ANSWER 24 OF 33 HCA COPYRIGHT 2007 ACS on STN

133:311774 **Nonaqueous electrolyte batteries**

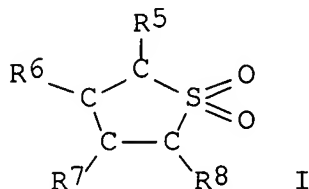
. Morita, Seiji; Urushihara, Kanji; Naruse, Satoru; Yamashita,

Tetsuya (Sanyo Electric Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho

JP 2000285928 A 20001013, 8 pp. (Japanese). CODEN:

JKXXAF. APPLICATION: JP 1999-89578 19990330.

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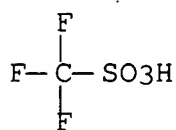
AB The **batteries** have **Li**, **Li alloy**, or **Li** intercalating carbonaceous anodes; metal oxide cathodes, and a **nonaq. electrolyte** soln. contg. a low b.p. solvent; where the **electrolyte**

soln. contains dialkyl sulfone, dialkyl sulfoxide, and/or sulfolane derivs. I, where R5-8 are H or alkyl groups.

IT 33454-82-9, **Lithium** trifluoromethanesulfonate  
(**nonaq. electrolyte** solns. contg. sulfones  
and sulfoxides and sulfolane derivs. for secondary  
**lithium batteries**)

RN 33454-82-9 HCA

CN Methanesulfonic acid, 1,1,1-trifluoro-, lithium salt (1:1) (CA  
INDEX NAME)

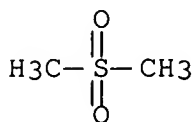


● Li

IT 67-71-0, Methyl sulfone  
(**nonaq. electrolyte** solns. contg. sulfones  
and sulfoxides and sulfolane derivs. for secondary  
**lithium batteries**)

RN 67-71-0 HCA

CN Methane, 1,1'-sulfonylbis- (CA INDEX NAME)



IC ICM H01M006-16

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST secondary **lithium battery electrolyte**  
sulfone additive; sulfoxide additive secondary **lithium**  
**battery electrolyte**

IT **Battery electrolytes**

(**nonaq. electrolyte** solns. contg. sulfones  
and sulfoxides and sulfolane derivs. for secondary  
**lithium batteries**)

IT 96-49-1, Ethylene carbonate 110-71-4, 1,2-Dimethoxyethane  
4437-85-8, Butylene carbonate **33454-82-9, Lithium**  
trifluoromethanesulfonate

(**nonaq. electrolyte** solns. contg. sulfones  
and sulfoxides and sulfolane derivs. for secondary  
**lithium batteries**)

IT 67-68-5, Methyl sulfoxide, uses **67-71-0**, Methyl sulfone  
126-33-0, Sulfolane 598-04-9, Butyl sulfone 2168-93-6, Butyl  
sulfoxide

(**nonaq. electrolyte** solns. contg. sulfones  
and sulfoxides and sulfolane derivs. for secondary  
**lithium batteries**)

L58 ANSWER 25 OF 33 HCA COPYRIGHT 2007 ACS on STN

132:323925 **Nonaqueous electrolyte** solutions and  
secondary **lithium batteries** using them.

Hamamoto, Shunichi; Abe, Hiroshi; Takai, Tsutomu; Matsumori, Yasuo  
(Ube Industries, Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 2000133305

A **20000512**, 5 pp. (Japanese). CODEN: JKXXAF.

APPLICATION: JP 1998-303524 19981026.

AB The **electrolyte** solns. contain sulfones R1SO2R2 (R1, R2 = Ph, benzyl, tolyl, C1-12  
alkyl, C3-6 cycloalkyl). Secondary **batteries** using the **electrolyte** solns. have high  
capacity and long cycle life.

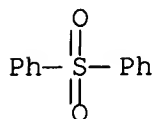
IT **127-63-9**, Diphenyl sulfone **21324-40-3**,

**Lithium hexafluorophosphate**

(secondary **Li batteries** using **nonaq**  
. **electrolyte** solns. contg. sulfones for high capacity  
and long cycle life)

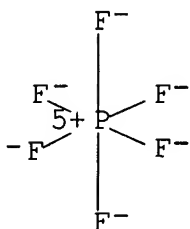
RN 127-63-9 HCA

CN Benzene, 1,1'-sulfonylbis- (CA INDEX NAME)



RN 21324-40-3 HCA

CN Phosphate(1-), hexafluoro-, lithium (1:1) (CA INDEX NAME)



●  $\text{Li}^+$

IC ICM H01M010-40

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST sulfone electrolyte soln lithium battery

IT Secondary batteries

(lithium; secondary Li batteries

using nonaq. electrolyte solns. contg.

sulfones for high capacity and long cycle life)

IT Battery electrolytes

(secondary Li batteries using nonaq

. electrolyte solns. contg. sulfones for high capacity  
and long cycle life)

IT Sulfones

(secondary Li batteries using nonaq

. electrolyte solns. contg. sulfones for high capacity  
and long cycle life)

IT 7782-42-5, Graphite, uses

(anode; secondary Li batteries using

nonaq. electrolyte solns. contg. sulfones for  
high capacity and long cycle life)

IT 12057-17-9, Lithium manganese oxide ( $\text{LiMn}_2\text{O}_4$ )

12190-79-3, Cobalt lithium oxide ( $\text{CoLiO}_2$ )

(cathode; secondary Li batteries using

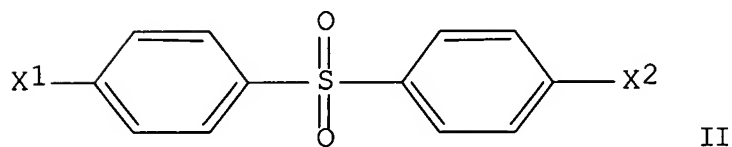
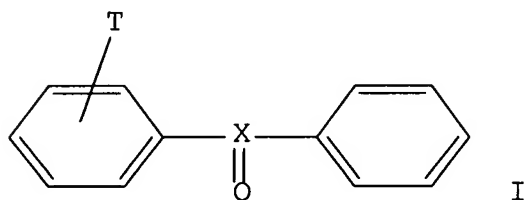
nonaq. electrolyte solns. contg. sulfones for  
high capacity and long cycle life)

IT 96-49-1, Ethylene carbonate 108-32-7, Propylene carbonate  
 127-63-9, Diphenyl sulfone 598-04-9, Dibutyl sulfone  
 599-66-6, Di(p-tolyl) sulfone 616-38-6, Dimethyl carbonate  
 21324-40-3, **Lithium hexafluorophosphate**  
 (secondary Li batteries using **nonaq**  
 . electrolyte solns. contg. sulfones for high capacity  
 and long cycle life)

L58 ANSWER 26 OF 33 HCA COPYRIGHT 2007 ACS on STN

130:198791 Rechargeable **lithium battery** with organic  
 electrolyte and carbon anode. Jehoulet, Christophe; Moteau,  
 Cecile (Alcatel, Fr.). Eur. Pat. Appl. EP 901180 A1  
 19990310, 11 pp. DESIGNATED STATES: R: AT, BE, CH, DE, DK,  
 ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO.  
 (French). CODEN: EPXXDW. APPLICATION: EP 1998-402068 19980817.  
 PRIORITY: FR 1997-10822 19970829.

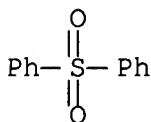
GI



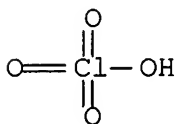
AB The Li secondary battery contains a Li cathode, a C anode, and an electrolyte contg. a  
 Li salt,  $\geq 1$  org. solvent, and an additive. The additive is an org. compd. contg. a X atom

connected to  $\geq 1$  O atom or X-O bonds electronically conjugated with  $\geq 1$  unsatd. bond.  
The compd. has a general formula (I) or (II) (X = S,C; T, X1, X2 = H, R, OH, OR, NH2, NHR, SH, SR, I, F, Cl, Br; R = C1-6 alkyl; T is in the ortho- or para- position).

IT 127-63-9, Diphenyl sulfone  
(in electrolyte for lithium secondary  
batteries)  
RN 127-63-9 HCA  
CN Benzene, 1,1'-sulfonylbis- (CA INDEX NAME)

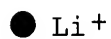
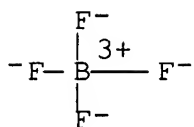


IT 7791-03-9, Lithium perchlorate 14283-07-9  
, Lithium tetrafluoroborate 21324-40-3,  
Lithium hexafluorophosphate 29935-35-1,  
Lithium hexafluoroarsenate 33454-82-9,  
Lithium trifluoromethanesulfonate 90076-65-6  
(in electrolyte for lithium secondary  
batteries)  
RN 7791-03-9 HCA  
CN Perchloric acid, lithium salt (1:1) (CA INDEX NAME)



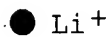
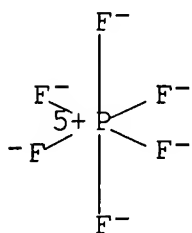
● Li

RN 14283-07-9 HCA  
CN Borate(1-), tetrafluoro-, lithium (1:1) (CA INDEX NAME)



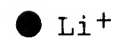
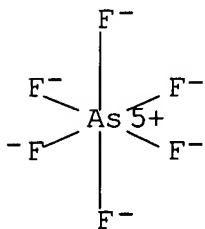
RN 21324-40-3 HCA

CN Phosphate(1-), hexafluoro-, lithium (1:1) (CA INDEX NAME)



RN 29935-35-1 HCA

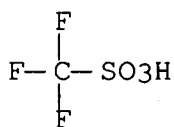
CN Arsenate(1-), hexafluoro-, lithium (1:1) (CA INDEX NAME)





RN 33454-82-9 HCA

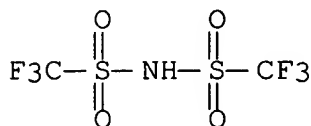
CN Methanesulfonic acid, 1,1,1-trifluoro-, lithium salt (1:1) (CA INDEX NAME)



● Li

RN 90076-65-6 HCA

CN Methanesulfonamide, 1,1,1-trifluoro-N-[(trifluoromethyl)sulfonyl]-, lithium salt (1:1) (CA INDEX NAME)



● Li

IC ICM H01M010-40

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST **battery electrolyte additive; lithium**

**battery electrolyte additive carbon anode**

IT **Battery electrolytes**

(additive for)

IT **Secondary batteries**

(**lithium**; rechargeable **lithium**

**battery with org. electrolyte and carbon anode)**

IT **127-63-9, Diphenyl sulfone 945-51-7, Diphenyl sulfoxide**

(in **electrolyte for lithium secondary batteries)**

IT **67-68-5, Dimethylsulfoxide, uses 68-12-2, Dimethylformamide, uses**

75-05-8, Acetonitrile, uses 75-56-9, uses 79-16-3,  
N-Methylacetamide 96-48-0,  $\gamma$ -Butyrolactone 96-49-1,  
Ethylene carbonate 105-58-8, Diethyl carbonate 108-32-7,  
Propylene carbonate 109-99-9, uses 123-39-7, N-Methylformamide  
126-33-0, Sulfolane 616-38-6, Dimethyl carbonate 616-42-2,  
Dimethyl sulfite 623-96-1, Dipropyl carbonate 646-06-0,  
1,3-Dioxolane 872-50-4, N-Methylpyrrolidone, uses  
7791-03-9, **Lithium** perchlorate 14283-07-9  
, **Lithium** tetrafluoroborate 21324-40-3,  
**Lithium** hexafluorophosphate 29935-35-1,  
**Lithium** hexafluoroarsenate 33454-82-9,  
**Lithium** trifluoromethanesulfonate 90076-65-6  
133395-17-2

(in electrolyte for lithium secondary  
batteries)

L58 ANSWER 27 OF 33 HCA COPYRIGHT 2007 ACS on STN

126:133588 **Nonaqueous electrolyte batteries**

using **electrolytes** containing self discharge inhibitors.

Jinno, Maruo; Uehara, Mayumi; Sakurai, Atsushi; Nishio, Koji; Saito,  
Toshihiko (Sanyo Denki Kk, Japan). Jpn. Kokai Tokkyo Koho JP  
08321312 A 19961203 Heisei, 5 pp. (Japanese). CODEN:  
JKXXAF. APPLICATION: JP 1995-150844 19950524.

AB **Li** batteries use **electrolytes** contg.  $\text{LiCF}_3\text{SO}_3$  or  $\text{LiPF}_6$  dissolved in high dielec. const. solvent selected from ethylene carbonate, propylene carbonate, and butylene carbonate; where the **electrolytes** contain 1-20 vol.% additive selected from triethylamine, n-butylamine, aniline, tri-Me hydroxylamine, 1-dimethylamino-2-methoxy ethane, acetonitrile, acrylonitrile, 3-methoxy propionitrile, benzonitrile, nitromethane, nitroethane, N,N-dimethylacetamide, N,N-dimethylformamide, formamide, N-methyl-2-pyrrolidone, N,N'-dimethyl imidazolidinone, isoxazole, 3,5-di-Me isoxazole, 3-methyl-2-oxazolidone, 1,2,3-oxadiazole, N-Me morpholine, di-Me sulfide, Et Me sulfide, 2-Me thiophene, 1-butane thiol, benzenethiol, di-Me sulfate, di-Et sulfate, di-Me sulfite, di-Et sulfite, butadienesulfone, 3-Me sulfolene, 1,4-thioxane, phenoxathiin, 1,4-thiazine, thiomorpholine, pyridine, 1,3-dimethyl-2-imidazolidinone, DMSO, di-Me sulfone, Me Et sulfonate, and di-Me sulfinite. The **electrolytes** may contain 1,2-dimethoxyethane. Since the additives react with **Li** in anodes and the solvents and the solutes in the **electrolytes** to form coatings on the anodes for prevention of the reaction between the **electrolytes** and the anodes, the **batteries** have improved storage property. These **batteries** have long shelf life.

IT 21324-40-3, **Lithium** hexafluorophosphate

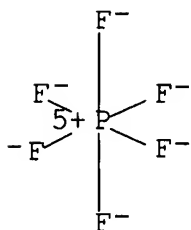
**33454-82-9, Lithium trifluoromethanesulfonate**

**(nonaq. electrolyte solns. contg. self**

**discharge inhibitors for lithium batteries)**

RN 21324-40-3 HCA

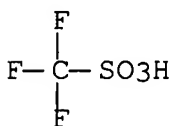
CN Phosphate(1-), hexafluoro-, lithium (1:1) (CA INDEX NAME)



● Li<sup>+</sup>

RN 33454-82-9 HCA

CN Methanesulfonic acid, 1,1,1-trifluoro-, lithium salt (1:1) (CA INDEX NAME)



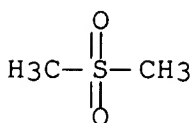
● Li

IT 67-71-0, Dimethylsulfone

**(self discharge inhibitors in nonaq.  
electrolyte solns. for lithium  
batteries)**

RN 67-71-0 HCA

CN Methane, 1,1'-sulfonylbis- (CA INDEX NAME)



IC ICM H01M006-16

ICS H01M010-40

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST **lithium battery electrolyte self**

discharge inhibitor

IT **Battery electrolytes**

(self discharge inhibitors in **nonaq.**

**electrolyte solns. for lithium**

**batteries)**

IT 7439-93-2, **Lithium**, uses 21324-40-3,

**Lithium hexafluorophosphate 33454-82-9,**

**Lithium trifluoromethanesulfonate**

(**nonaq. electrolyte solns. contg. self**

**discharge inhibitors for lithium batteries)**

IT 62-53-3, Aniline, uses 64-67-5, Diethyl sulfate 67-68-5,

Dimethylsulfoxide, uses 67-71-0, Dimethylsulfone

68-12-2, N,N-Dimethylformamide, uses 75-05-8, Acetonitrile, uses

75-12-7, Formamide, uses 75-18-3, Dimethylsulfide 75-52-5,

Nitromethane, uses 77-78-1, Dimethyl sulfate 79-24-3,

Nitroethane 80-73-9, N,N'-Dimethylimidazolidinone 100-47-0,

Benzonitrile, uses 107-13-1, Acrylonitrile, uses 108-98-5,

Benzenethiol, uses 109-02-4, N-Methylmorpholine 109-73-9,

n-Butylamine, uses 109-79-5, 1-Butanethiol 110-67-8,

3-Methoxypropionitrile 110-86-1, Pyridine, uses 121-44-8,

Triethylamine, uses 123-90-0, Thiomorpholine 127-19-5,

N,N-Dimethylacetamide 262-20-4, Phenoxathiin 288-14-2, Isoxazole

288-43-7, 1,2,3-Oxadiazole 290-56-2, 1,4-Thiazine 290-57-3,

1,4-Thiazine 300-87-8, 3,5-Dimethylisoxazole 554-14-3,

2-Methylthiophene 616-42-2, Dimethyl sulfite 623-81-4, Diethyl

sulfite 624-89-5, Ethylmethyldisulfide 666-15-9 872-50-4,

N-Methyl-2-pyrrolidone, uses 1193-10-8, 3-Methylsulfolene

1912-28-3, Methyl ethyl sulfonate 3030-44-2 5669-39-6,

Trimethylhydroxylamine 15980-15-1, 1,4-Thioxane 19836-78-3

28452-93-9, Butadienesulfone  
(self discharge inhibitors in **nonaq.**  
**electrolyte** solns. for **lithium**  
**batteries**)

IT 96-49-1, Ethylene carbonate 108-32-7, Propylene carbonate  
110-71-4, 1,2-Dimethoxyethane 4437-85-8, Butylene carbonate  
(solvents for **nonaq. electrolyte** solns.  
contg. self discharge inhibitors for **lithium**  
**batteries**)

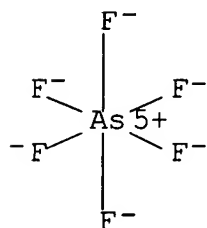
L58 ANSWER 28 OF 33 HCA COPYRIGHT 2007 ACS on STN  
121:160817 Thermal **lithium battery**. Crepy, Gilles;  
Mahieu, Gerard; Mimoun, Michel (SAFT SA, Fr.). Fr. Demande FR  
2697676 A1 19940506, 15 pp. (French). CODEN: FRXXBL.  
APPLICATION: FR 1992-12958 19921029.

AB The **battery** contains a **Li** or **Li** alloy anode, a **S** and oxides cathode and **electrolyte**  
contg. **Li** salts at 0.5-3.0 mol **Li** salt/kg DMS.

IT 29935-35-1, **Lithium** hexafluoroarsenate  
(**electrolyte**, in **nonaq.** thermal  
**lithium battery**)

RN 29935-35-1 HCA

CN Arsenate(1-), hexafluoro-, lithium (1:1) (CA INDEX NAME)

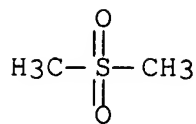


●  $\text{Li}^+$

IT 67-71-0, Dimethylsulfone  
(solvent, in **nonaq.** thermal **lithium**  
**battery**)

RN 67-71-0 HCA

CN Methane, 1,1'-sulfonylbis- (CA INDEX NAME)



IC ICM H01M006-36

ICS H01M006-20

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST **lithium battery nonaq thermal**

IT Carbon black, uses

(cathode contg., in **nonaq. thermal lithium battery**)

IT **Batteries**, primary

(thermal, **lithium, nonaq.**)

IT **lithium alloy**, base

(anode, in **nonaq. thermal lithium battery**)

IT 7439-93-2, **Lithium**, uses

(anode, in **nonaq. thermal lithium battery**)

IT 1313-13-9, Manganese dioxide, uses 1314-62-1, Vanadium pentoxide, uses 7704-34-9, Sulfur, uses 12068-85-8, Iron sulfide (fes2)

(cathode contg., in **nonaq. thermal lithium battery**)

IT 7447-41-8, **Lithium chloride**, uses 7550-35-8,

**Lithium bromide** 7789-24-4, **Lithium fluoride**,

uses 29935-35-1, **Lithium hexafluoroarsenate**

(electrolyte, in **nonaq. thermal lithium battery**)

IT 1309-48-4, Magnesia, uses 1344-28-1, Alumina, uses 10043-11-5,

Boron nitride, uses

(in **nonaq. thermal lithium battery**)

IT 67-71-0, Dimethylsulfone

(solvent, in **nonaq. thermal lithium battery**)

115:186786 Secondary **nonaqueous batteries**.

Watanabe, Hiroshi; Yoshimura, Seiji; Furukawa, Saneshiro (Sanyo Electric Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 03152879 A

19910628 Heisei, 8 pp. (Japanese). CODEN: JKXXAF.

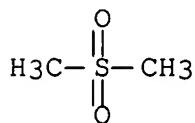
APPLICATION: JP 1989-290222 19891108.

AB Secondary **Li batteries** use **electrolytes** comprising solvents contg. SO groups and Li salts of F-contg. Lewis acids. The **batteries** have high storage stability and long cycle life. A 1M F3CSO3Li/50:50 (vol.) 3-methylsulfolane-MeOCH2CH2OMe **electrolyte** soln. was used for **Li-Al/Mn oxide batteries**.

IT 67-71-0, Dimethylsulfone  
(**electrolyte solvent mixts. contg.**, for secondary **lithium batteries**)

RN 67-71-0 HCA

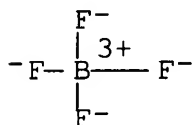
CN Methane, 1,1'-sulfonylbis- (CA INDEX NAME)



IT 14283-07-9, **Lithium tetrafluoroborate**  
18424-17-4, **Lithium hexafluoroantimonate**  
21324-40-3, **Lithium hexafluorophosphate**  
29935-35-1, **Lithium hexafluoroarsenate**  
33454-82-9, **Lithium trifluoromethanesulfonate**  
(**electrolyte, solvent mixts. for, in secondary lithium batteries**)

RN 14283-07-9 HCA

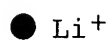
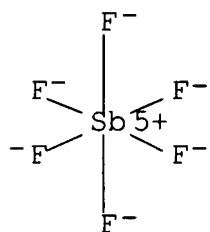
CN Borate(1-), tetrafluoro-, lithium (1:1) (CA INDEX NAME)



● Li<sup>+</sup>

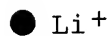
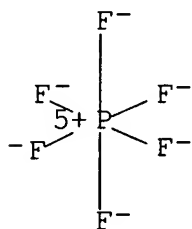
RN 18424-17-4 HCA

CN Antimonate(1-), hexafluoro-, lithium (1:1), (OC-6-11)- (CA INDEX NAME)



RN 21324-40-3 HCA

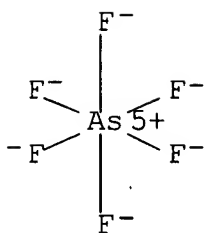
CN Phosphate(1-), hexafluoro-, lithium (1:1) (CA INDEX NAME)



RN 29935-35-1 HCA

CN Arsenate(1-), hexafluoro-, lithium (1:1) (CA INDEX NAME)

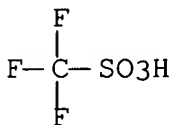




● Li<sup>+</sup>

RN 33454-82-9 HCA

CN Methanesulfonic acid, 1,1,1-trifluoro-, lithium salt (1:1) (CA  
INDEX NAME)



● Li

IC ICM H01M010-40

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST **lithium battery lithium**

trifluoromethanesulfonate **electrolyte**; methylsulfolane  
**electrolyte solvent lithium battery**

IT **Batteries, secondary**

(**lithium, electrolyte** solvents and salts in,  
for storage stability and cycle life)

IT 67-68-5, Dimethylsulfoxide, uses and miscellaneous **67-71-0**

, Dimethylsulfone 126-33-0, Sulfolane 616-42-2, Dimethylsulfite  
872-93-5, 3-Methylsulfolane

(**electrolyte solvent mixts. contg.**, for secondary  
**lithium batteries**)

IT **14283-07-9, Lithium tetrafluoroborate**

18424-17-4, **Lithium** hexafluoroantimonate  
 21324-40-3, **Lithium** hexafluorophosphate  
 29935-35-1, **Lithium** hexafluoroarsenate  
 33454-82-9, **Lithium** trifluoromethanesulfonate  
 (electrolyte, solvent mixts. for, in secondary  
 lithium batteries)

L58 ANSWER 30 OF 33 HCA COPYRIGHT 2007 ACS on STN

108:153639 **Nonaqueous** sulfur dioxide-based **electrolyte**

for **batteries**. Gabano, Jean Paul; Sarradin, Joel;

Messina, Richard; Perichon, Jacques (Societe des Accumulateurs Fixes  
 et de Traction (SAFT), Fr.). Eur. Pat. Appl. EP 252494 A1

19880113, 7 pp. DESIGNATED STATES: R: DE, FR, GB, IT, SE.

(French). CODEN: EPXXDW. APPLICATION: EP 1987-109801 19870707.

PRIORITY: FR 1986-10096 19860710.

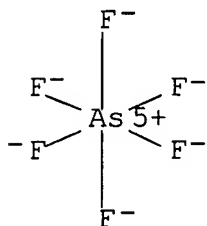
AB The **nonaq. battery electrolyte** contains SO<sub>2</sub>, 1-6M dimethylsulfone, and 0.5-2M metal salt (LiCl or LiAsF<sub>6</sub>). A **Li battery** with a spinally wound porous C cathode on an expanded Al grid, a Li foil anode, and a microporous Celgard film separator, all immersed in an **electrolyte soln.** contg. liq. SO<sub>2</sub> (.apprx.30 cm<sup>3</sup>/component), 3M dimethylsulfone, and 0.5M LiCl, had an open-circuit voltage of 2.9 v. The **battery** has a capacity of 5.5A-h at 25° and discharge current of 1A and very small electrode polarization.

IT 29935-35-1, **Lithium** hexafluoroarsenate (LiAsF<sub>6</sub>)

(catholytes contg. dimethylsulfone and, sulfur dioxide, in  
**lithium batteries**)

RN 29935-35-1 HCA

CN Arsenate(1-), hexafluoro-, lithium (1:1) (CA INDEX NAME)

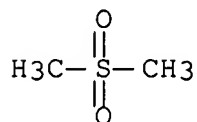


● Li<sup>+</sup>

IT 67-71-0, Dimethylsulfone  
(catholytes contg. **lithium** salt and, sulfur dioxide, in  
**lithium batteries**)

RN 67-71-0 HCA

CN Methane, 1,1'-sulfonylbis- (CA INDEX NAME)



IC ICM H01M006-14

ICS H01M010-36

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

Section cross-reference(s): 72

ST **lithium** sulfur dioxide battery  
**electrolyte; electrolyte dimethylsulfone**  
**lithium salt battery**

IT **Electrolytic polarization**  
(in **lithium batteries** with dimethylsulfone-  
**lithium salt nonaq. electrolytes**)

IT **Batteries, secondary**  
(**lithium-sulfur dioxide, dimethylsulfone-**  
**lithium salt electrolytes in**)

IT 7447-41-8, **Lithium** chloride, uses and miscellaneous  
29935-35-1, **Lithium** hexafluoroarsenate (LiAsF<sub>6</sub>)  
(catholytes contg. dimethylsulfone and, sulfur dioxide, in  
**lithium batteries**)

IT 67-71-0, Dimethylsulfone  
(catholytes contg. **lithium** salt and, sulfur dioxide, in  
**lithium batteries**)

IT 7446-09-5, Sulfur dioxide, uses and miscellaneous  
(catholytes, contg. dimethylsulfone and **lithium** salt  
and, in **lithium batteries**)

L58 ANSWER 31 OF 33 HCA COPYRIGHT 2007 ACS on STN  
107:220471 Investigation of **lithium** intercalation materials  
with **organic solvents** and molten salts as

**electrolytes** at temperatures between 60 and 175°.

Pereira-Ramos, Jean Pierre; Messina, Richard; Piolet, Colette; Devynck, Jacques (Lab. Electrochim., Catal. Synth. Org., CNRS, Thiais, 94320, Fr.). Journal of Power Sources, 20(3-4), 221-30 (English) 1987. CODEN: JPSODZ. ISSN: 0378-7753.

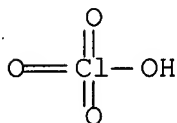
AB Li intercalation in TiS<sub>2</sub> and V oxides (V<sub>2</sub>O<sub>5</sub>, VO<sub>4</sub>, V<sub>2</sub>O<sub>3</sub>) was investigated in (1) molten chloroaluminates (butylpyridinium chloride-AlCl<sub>3</sub>-LiCl) at 60° and LiAlCl<sub>4</sub>-LiCl (satd.) at 175° and (2) Me<sub>2</sub>SO<sub>2</sub> + LiClO<sub>4</sub> or LiAsF<sub>6</sub> at 130-150°. The intercalation process was studied by cyclic voltammetry, galvanostatic discharge/charge, and open-circuit voltage measurements. In chloroaluminates, TiS<sub>2</sub> is stable in both media, with a 1-step intercalation at 0.40 V (60°) or 0.65 V (175°) (vs. Al ref.). V<sub>2</sub>O<sub>5</sub> can only be cycled at a low temp. (60°), and 2 steps are obsd. at .apprx.1 V and 0.45 V. In Me<sub>2</sub>SO<sub>2</sub>, V<sub>2</sub>O<sub>5</sub> intercalates .apprx.2.5 Li<sup>+</sup>/unit V<sub>2</sub>O<sub>5</sub>, with 4 steps, as obsd. in propylene carbonate (PC). The open-circuit voltage (OCV) measurements at different intercalation steps indicate that the effect of temp. increases the kinetics of the processes. A comparison of the OCV variations with Li<sup>+</sup> concn. in Me<sub>2</sub>SO<sub>2</sub> and PC suggests that the intercalation process differs in both solvents. The difference can be correlated with changes in the Li<sup>+</sup> solvation effects of the solvents.

IT 7791-03-9, **Lithium perchlorate 29935-35-1**

, **Lithium hexafluoroarsenate**  
(**electrolytes**, in molten di-Me sulfone, **lithium**  
intercalation in, for reversible **lithium**  
**batteries**)

RN 7791-03-9 HCA

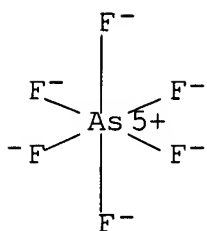
CN Perchloric acid, lithium salt (1:1) (CA INDEX NAME)



● Li

RN 29935-35-1 HCA

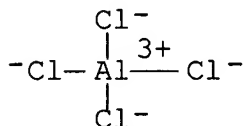
CN Arsenate(1-), hexafluoro-, lithium (1:1) (CA INDEX NAME)



IT 14024-11-4, **Lithium** tetrachloroaluminate  
(**lithium** intercalation in, for reversible  
**lithium** batteries)

RN 14024-11-4 HCA

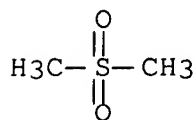
CN Aluminate(1-), tetrachloro-, lithium (1:1), (T-4)- (CA INDEX NAME)



IT 67-71-0, Dimethylsulfone  
(molten **electrolytes**, contg. **lithium** salts,  
**lithium** intercalation in, for reversible **lithium**  
**batteries**)

RN 67-71-0 HCA

CN Methane, 1,1'-sulfonylbis- (CA INDEX NAME)



CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

Section cross-reference(s): 72

ST **lithium** intercalation cathode **battery**; titanium sulfide **lithium** intercalation cathode; vanadium oxide **lithium** intercalation cathode; chloroaluminate **lithium** intercalation cathode; methyl sulfone **lithium** salt cathode

IT **Batteries**, secondary  
(**lithium**-vanadium pentoxide, contg. di-Me sulfone-**lithium** perchlorate **electrolyte**, performance of)

IT Inclusion reaction  
(intercalation, electrochem., of **lithium**, in titanium sulfide and vanadium oxides, in **batteries**, with **org. solvents** and molten salts)

IT 7791-03-9, **Lithium** perchlorate 29935-35-1  
, **Lithium** hexafluoroarsenate  
(**electrolytes**, in molten di-Me sulfone, **lithium** intercalation in, for reversible **lithium batteries**)

IT 11126-15-1P, **Lithium** vanadium oxide 12680-08-9P,  
**Lithium** titanium sulfide  
(intercalated, formation of, in **org. solvents** and molten salt **electrolytes**, temp. effect on, for reversible **lithium batteries**)

IT 14024-11-4, **Lithium** tetrachloroaluminate  
67226-46-4  
(**lithium** intercalation in, for reversible **lithium batteries**)

IT 1314-34-7, Vanadium oxide (V<sub>2</sub>O<sub>3</sub>) 1314-62-1, Vanadium oxide (V<sub>2</sub>O<sub>5</sub>),  
uses and miscellaneous 12036-21-4 12039-13-3  
(**lithium** intercalation in, in **org. solvents** and molten salt **electrolytes**, temp. effect on, for reversible **lithium batteries**)

IT 67-71-0, Dimethylsulfone  
(molten **electrolytes**, contg. **lithium** salts, **lithium** intercalation in, for reversible **lithium batteries**)

L58 ANSWER 32 OF 33 HCA COPYRIGHT 2007 ACS on STN

105:137122 **Battery with a nonaqueous**

**electrolyte.** Gabano, Jean Paul; Broussely, Michel;

Pereira-Ramos, Jean Pierre; Messina, Richard; Perichon, Jacques

(Societe des Accumulateurs Fixes et de Traction (SAFT), Fr.). Eur.

Pat. Appl. EP 189891 A1 **19860806**, 10 pp. DESIGNATED

STATES: R: AT, BE, CH, DE, FR, GB, IT, LI, LU, NL, SE. (French).

CODEN: EPXXDW. APPLICATION: EP 1986-101075 19860128. PRIORITY: FR  
1985-1309 19850130.

AB The **battery** consists of an anode selected from alkali metals, alk. earth metals, and Al; a cathode selected from CuO, Cu<sub>4</sub>O(PO<sub>4</sub>)<sub>2</sub>, graphite fluoride, MnO<sub>2</sub>, V<sub>2</sub>O<sub>5</sub>, MoS<sub>3</sub>, TiS<sub>2</sub>, V<sub>2</sub>S<sub>5</sub>, V<sub>6</sub>O<sub>13</sub>, MoS<sub>2</sub>, NiPS<sub>3</sub>; and ≥1 linear aliph. or arom. sulfone **electrolyte** solvent, e.g., dimethylsulfone. The possible solvents are eutectic mixts. detd. from binary or ternary diagrams. When Li or Li-Al anode is used, the **electrolyte** solute is LiClO<sub>4</sub>, LiBF<sub>4</sub>, LiCF<sub>3</sub>SO<sub>3</sub>, LiAlCl<sub>4</sub>, or LiAsF<sub>6</sub>. The **battery** may be used at 100-200°. Sp. conductivities of these Li salts in dimethylsulfone at 150 and 107° as function fo concn. are given.

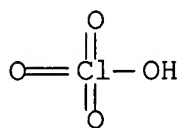
IT 7791-03-9 14024-11-4 14283-07-9

29935-35-1 33454-82-9

(elec. cond. of, in dimethylsulfone, for **battery**  
**electrolytes**, temp. effect on)

RN 7791-03-9 HCA

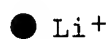
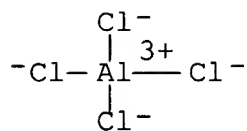
CN Perchloric acid, lithium salt (1:1) (CA INDEX NAME)



● Li

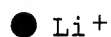
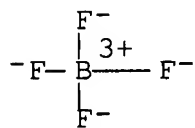
RN 14024-11-4 HCA

CN Aluminate(1-), tetrachloro-, lithium (1:1), (T-4)- (CA INDEX NAME)



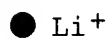
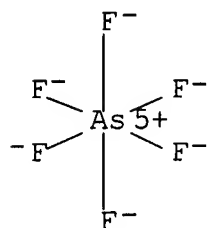
RN 14283-07-9 HCA

CN Borate(1-), tetrafluoro-, lithium (1:1) (CA INDEX NAME)



RN 29935-35-1 HCA

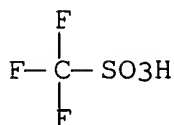
CN Arsenate(1-), hexafluoro-, lithium (1:1) (CA INDEX NAME)



RN 33454-82-9 HCA

CN Methanesulfonic acid, 1,1,1-trifluoro-, lithium salt (1:1) (CA INDEX NAME)





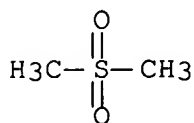
● Li

IT 67-71-0

(electrolyte contg., for **lithium**  
**batteries**)

RN 67-71-0 HCA

CN Methane, 1,1'-sulfonylbis- (CA INDEX NAME)



IC ICM H01M006-16

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

Section cross-reference(s): 76

ST **lithium org electrolyte battery**;  
**dimethylsulfone electrolyte lithium**  
**battery**; elec cond **lithium** salt; perchlorate  
**lithium** elec cond; fluoroborate **lithium** elec cond;  
chloroaluminate **lithium** elec cond; fluoarsenate  
**lithium** elec cond; trifluoromethanesulfonate **lithium**  
elec cond

IT **Batteries, primary**  
(**lithium**, with **electrolyte** contg.  
dimethylsulfone)

IT Electric conductivity and conduction  
(of **lithium** salt in dimethylsulfone, for  
**battery electrolytes**, temp. effect on)

IT 1314-62-1, uses and miscellaneous 1317-38-0, uses and  
miscellaneous

(cathodes, for org. electrolyte batteries)

IT 7791-03-9 14024-11-4 14283-07-9

29935-35-1 33454-82-9

(elec. cond. of, in dimethylsulfone, for battery  
electrolytes, temp. effect on)

IT 67-71-0

(electrolyte contg., for lithium  
batteries)

L58 ANSWER 33 OF 33 HCA COPYRIGHT 2007 ACS on STN

105:14129 Electrochemical behavior of some transition metal oxides in

molten dimethyl sulfone at 150°C. Pereira-Ramos, J. P.;

Messina, R.; Perichon, J. (Lab. Electrochim. Org., Univ. Paris Val  
de Marne, Creteil, 94010, Fr.). Journal of Applied

Electrochemistry, 16(3), 379-86 (English) 1986. CODEN:

JAELBJ. ISSN: 0021-891X.

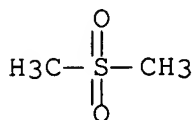
AB In view of the possible application to **non-aq. Li** cells operating at relatively high  
temps., fused di-Me sulfone (DMSO<sub>2</sub>) was used as the **electrolyte** solvent in **Li** cells at  
150°. The stability of **Li** in DMSO<sub>2</sub> melt was good as compared with that obsd. in **org.**  
**solvents** such as propylene carbonate, thus indicating that the **Li<sup>+</sup>/Li** system can be used  
as a suitable ref. electrode in this medium. The electrochem. behavior of some transition  
metal oxides was investigated in LiClO<sub>4</sub> solns. in DMSO<sub>2</sub> melts. The results obtained  
from voltammetric and chronopotentiometric measurements showed a satisfactory  
behavior for all the cathodic materials tested. Moreover, electrochem. insertion of **Li<sup>+</sup>**  
into the crystal lattice of these oxides is a very fast process. Thus DMSO<sub>2</sub> melt appears  
to be a very interesting **org. solvent** usable in high energy d. **non -aq. Li** cells.

IT 67-71-0

(transition metal oxide electrochem. reactions in **lithium**  
perchlorate-contg. melts of)

RN 67-71-0 HCA

CN Methane, 1,1'-sulfonylbis- (CA INDEX NAME)



CC 72-3 (Electrochemistry)

Section cross-reference(s): 52

ST **lithium battery** transition metal oxide; cathode

**battery** transition metal oxide; **electrolyte**

**battery** methyl sulfone solvent

IT Transition metal oxides

(electrochem. reactions of, in di-Me sulfone-contg.

**lithium** perchlorate, **battery** in relation to)

IT Cathodes

(**battery**, transition metal oxides)

IT 7439-93-2, uses and miscellaneous

(anodes, in **nonaq. batteries** with transition

metal oxides in di-Me sulfone melts contg. **lithium**

perchlorate)

IT 1313-13-9, reactions 1313-27-5, reactions 1314-62-1, reactions

(electrochem. reactions of, in di-Me sulfone-contg.

**lithium** perchlorate, **battery** in relation to)

IT 67-71-0

(transition metal oxide electrochem. reactions in **lithium**

perchlorate-contg. melts of)



=> D L50 1-6 CBIB ABS HITSTR HITIND

L50 ANSWER 1 OF 6 HCA COPYRIGHT 2007 ACS on STN

146:145946 **Electrolyte for lithium secondary**

**battery.** Kim, Cheonsoo (Samsung Sdi Co., Ltd., S. Korea).

U.S. Pat. Appl. Publ. US 2007009806 A1 20070111, 11pp. (English).

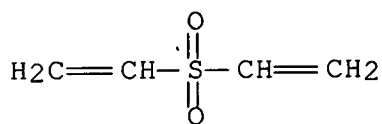
CODEN: USXXCO. APPLICATION: US 2006-481911 20060707. PRIORITY: KR 2005-61409 20050707.

AB The invention concerns an **electrolyte** for a **lithium secondary battery** and a **lithium secondary battery** having the **electrolyte**, the **electrolyte** including a **lithium salt**; a **non-aq. org. solvent** including  $\gamma$ -butyrolactone-; and a succinic anhydride.

IT 77-77-0, Divinyl sulfone  
(**electrolyte for lithium secondary battery**)

RN 77-77-0 HCA

CN Ethene, 1,1'-sulfonylbis- (CA INDEX NAME)



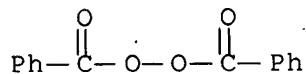
IT 94-36-0, Dibenzoyl peroxide, reactions 105-64-6,  
Di-isopropyl peroxydicarbonate 105-74-8, Dilauroyl  
peroxide 107-71-1, tert-Butyl peroxy acetate  
109-13-7, tert-Butyl peroxy isobutyrate 110-22-5,  
Diacetyl peroxide 614-45-9, tert-Butyl peroxy benzoate  
686-31-7, tert-Amylperoxy 2-ethyl hexanoate 927-07-1  
, tert-Butyl peroxy pivalate 2372-21-6, tert-Butyl peroxy  
isopropyl carbonate 3006-82-4, tert-Butylperoxy-2-ethyl  
hexanoate 3851-87-4, Bis(3,5,5-trimethylhexanoyl) peroxide  
13122-18-4 15518-51-1, Diethylene glycol  
bis(tert-butyl peroxy carbonate) 15520-11-3,  
Bis(4-tert-butylcyclohexyl) peroxydicarbonate 16111-62-9,  
Di-2-ethylhexyl peroxy dicarbonate 26748-38-9, tert-Butyl  
peroxy neoheptanoate 29240-17-3, tert-Amyl peroxy pivalate  
34443-12-4, tert-Butyl peroxy-2-ethylhexyl carbonate

36536-42-2 52238-68-3 68860-54-8

(electrolyte for lithium secondary  
battery)

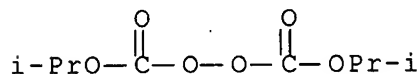
RN 94-36-0 HCA

CN Peroxide, dibenzoyl (CA INDEX NAME)



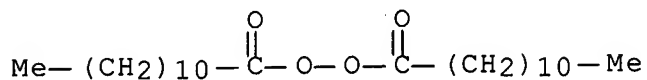
RN 105-64-6 HCA

CN Peroxydicarbonic acid, C,C'-bis(1-methylethyl) ester (CA INDEX  
NAME)



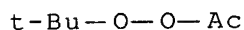
RN 105-74-8 HCA

CN Peroxide, bis(1-oxododecyl) (CA INDEX NAME)



RN 107-71-1 HCA

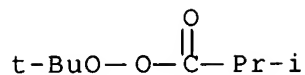
CN Ethaneperoxoic acid, 1,1-dimethylethyl ester (CA INDEX NAME)



RN 109-13-7 HCA

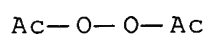
CN Propaneperoxoic acid, 2-methyl-, 1,1-dimethylethyl ester (CA INDEX

NAME)



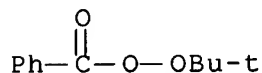
RN 110-22-5 HCA

CN Peroxide, diacetyl (CA INDEX NAME)



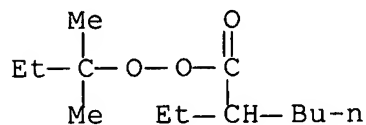
RN 614-45-9 HCA

CN Benzenecarboperoxoic acid, 1,1-dimethylethyl ester (CA INDEX NAME)



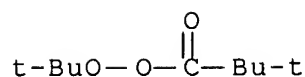
RN 686-31-7 HCA

CN Hexaneperoxoic acid, 2-ethyl-, 1,1-dimethylpropyl ester (CA INDEX NAME)



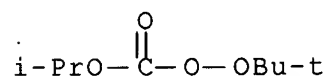
RN 927-07-1 HCA

CN Propaneperoxoic acid, 2,2-dimethyl-, 1,1-dimethylethyl ester (CA INDEX NAME)



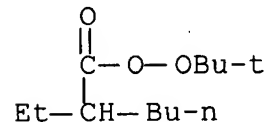
RN 2372-21-6 HCA

CN Carbonoperoxoic acid, OO-(1,1-dimethylethyl) O-(1-methylethyl) ester  
(CA INDEX NAME)



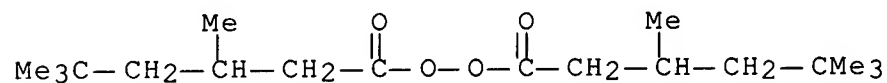
RN 3006-82-4 HCA

CN Hexaneperoxoic acid, 2-ethyl-, 1,1-dimethylethyl ester (CA INDEX  
NAME)



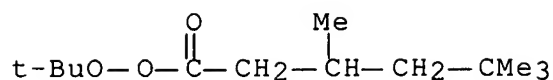
RN 3851-87-4 HCA

CN Peroxide, bis(3,5,5-trimethyl-1-oxohexyl) (CA INDEX NAME)



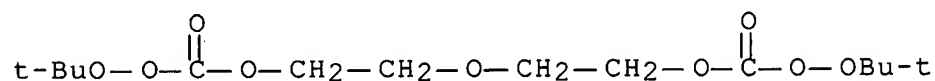
RN 13122-18-4 HCA

CN Hexaneperoxoic acid, 3,5,5-trimethyl-, 1,1-dimethylethyl ester (CA  
INDEX NAME)



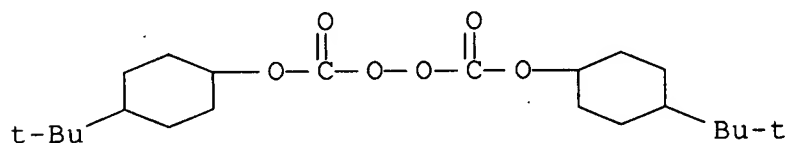
RN 15518-51-1 HCA

CN 2,5,8,10,11-Pentaoxatridecaneperoxoic acid, 12,12-dimethyl-9-oxo-,  
1,1-dimethylethyl ester (CA INDEX NAME)



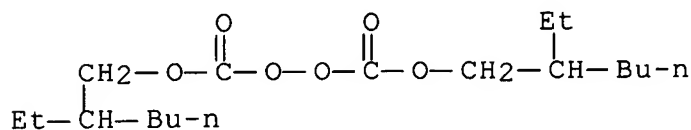
RN 15520-11-3 HCA

CN Peroxydicarbonic acid, C,C'-bis[4-(1,1-dimethylethyl)cyclohexyl]  
ester (CA INDEX NAME)



RN 16111-62-9 HCA

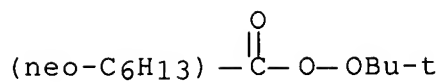
CN Peroxydicarbonic acid, C,C'-bis(2-ethylhexyl) ester (CA INDEX NAME)



RN 26748-38-9 HCA

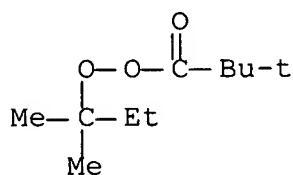
CN Neoheptaneperoxoic acid, 1,1-dimethylethyl ester (CA INDEX NAME)





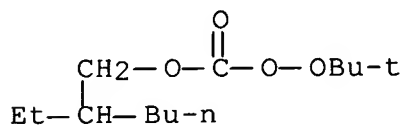
RN 29240-17-3 HCA

CN Propaneperoxoic acid, 2,2-dimethyl-, 1,1-dimethylpropyl ester (CA INDEX NAME)



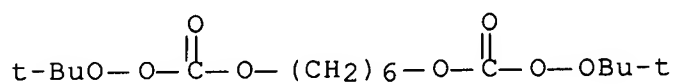
RN 34443-12-4 HCA

CN Carbonoperoxoic acid, OO-(1,1-dimethylethyl) O-(2-ethylhexyl) ester (CA INDEX NAME)



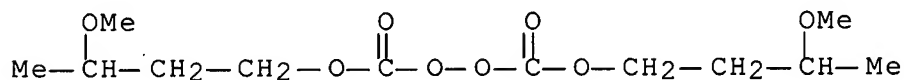
RN 36536-42-2 HCA

CN Carbonoperoxoic acid, O,O'-1,6-hexanediyl OO,OO'-bis(1,1-dimethylethyl) ester (CA INDEX NAME)



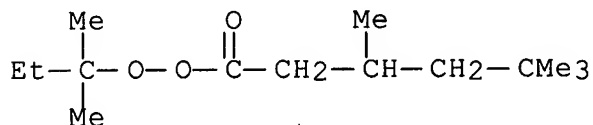
RN 52238-68-3 HCA

CN Peroxydicarbonic acid, C,C'-bis(3-methoxybutyl) ester (CA INDEX NAME)



RN 68860-54-8 HCA

CN Hexaneperoxoic acid, 3,5,5-trimethyl-, 1,1-dimethylpropyl ester (CA INDEX NAME)



IT 78-67-1, 2,2'-Azo-bis(isobutyronitrile) 7791-03-9,

**Lithium perchlorate 10377-51-2, Lithium**

**iodide 14024-11-4, Lithium tetrachloroaluminate**

**14283-07-9, Lithium tetrafluoroborate**

**18424-17-4, Lithium hexafluoroantimonate**

**21324-40-3, Lithium hexafluorophosphate**

**29935-35-1, Lithium hexafluoroarsenate**

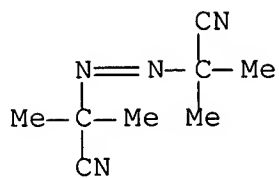
**33454-82-9, Lithium triflate 90076-65-6**

**131651-65-5**

(electrolyte for lithium secondary  
battery)

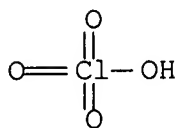
RN 78-67-1 HCA

CN Propanenitrile, 2,2'-(1,2-diazenediyl)bis[2-methyl- (CA INDEX NAME)



RN 7791-03-9 HCA

CN Perchloric acid, lithium salt (1:1) (CA INDEX NAME)



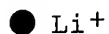
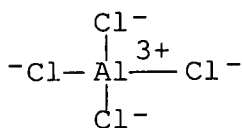
RN 10377-51-2 HCA

CN Lithium iodide (LiI) (CA INDEX NAME)



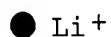
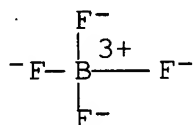
RN 14024-11-4 HCA

CN Aluminate(1-), tetrachloro-, lithium (1:1), (T-4)- (CA INDEX NAME)



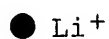
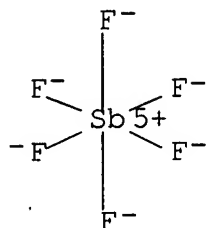
RN 14283-07-9 HCA

CN Borate(1-), tetrafluoro-, lithium (1:1) (CA INDEX NAME)



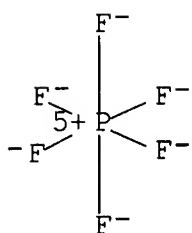
RN 18424-17-4 HCA

CN Antimonate(1-), hexafluoro-, lithium (1:1), (OC-6-11)- (CA INDEX NAME)



RN 21324-40-3 HCA

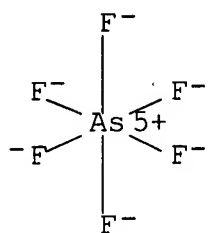
CN Phosphate(1-), hexafluoro-, lithium (1:1) (CA INDEX NAME)



● Li<sup>+</sup>

RN 29935-35-1 HCA

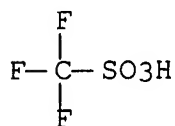
CN Arsenate(1-), hexafluoro-, lithium (1:1) (CA INDEX NAME)



● Li<sup>+</sup>

RN 33454-82-9 HCA

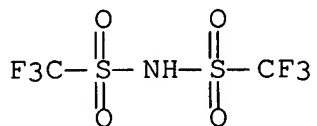
CN Methanesulfonic acid, 1,1,1-trifluoro-, lithium salt (1:1) (CA INDEX NAME)



● Li

RN 90076-65-6 HCA

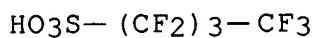
CN Methanesulfonamide, 1,1,1-trifluoro-N-[(trifluoromethyl)sulfonyl]-,  
lithium salt (1:1) (CA INDEX NAME)



● Li

RN 131651-65-5 HCA

CN 1-Butanesulfonic acid, 1,1,2,2,3,3,4,4,4-nonafluoro-, lithium salt  
(1:1) (CA INDEX NAME)



● Li

INCL 429329000; 429332000; 429200000

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST **electrolyte lithium secondary battery**

IT **Battery electrolytes**

(**electrolyte for lithium secondary  
battery**)

IT **Aromatic hydrocarbons, uses**

Esters, uses

Ethers, uses

Ketones, uses

(**electrolyte for lithium secondary  
battery**)

IT **Secondary batteries**

(**lithium; electrolyte for lithium**)

secondary battery)

IT 77-77-0, Divinyl sulfone 96-48-0,  $\gamma$ -Butyrolactone  
108-30-5, Succinic anhydride, uses 872-36-6, Vinylene carbonate  
3741-38-6, Ethylene sulfite 25721-76-0, Poly(ethylene  
glycol)dimethacrylate 26570-48-9, Poly(ethylene glycol)diacrylate  
413569-08-1 919110-87-5

(electrolyte for lithium secondary  
battery)

IT 94-36-0, Dibenzoyl peroxide, reactions 105-64-6,  
Di-isopropyl peroxydicarbonate 105-74-8, Dilauroyl  
peroxide 107-71-1, tert-Butyl peroxy acetate  
109-13-7, tert-Butyl peroxy isobutyrate 110-22-5,  
Diacetyl peroxide 614-45-9, tert-Butyl peroxy benzoate  
686-31-7, tert-Amylperoxy 2-ethyl hexanoate 927-07-1  
, tert-Butyl peroxy pivalate 2372-21-6, tert-Butyl peroxy  
isopropyl carbonate 3006-82-4, tert-Butylperoxy-2-ethyl  
hexanoate 3851-87-4, Bis(3,5,5-trimethylhexanoyl) peroxide  
13122-18-4 15518-51-1, Diethylene glycol  
bis(tert-butyl peroxy carbonate) 15520-11-3,  
Bis(4-tert-butylcyclohexyl) peroxydicarbonate 16111-62-9,  
Di-2-ethylhexyl peroxy dicarbonate 26748-38-9, tert-Butyl  
peroxy neoheptanoate 29240-17-3, tert-Amyl peroxy pivalate  
34443-12-4, tert-Butyl peroxy-2-ethylhexyl carbonate  
36536-42-2 51938-28-4, tert-Hexyl peroxy pivalate  
52238-68-3 68860-54-8 919110-90-0

(electrolyte for lithium secondary  
battery)

IT 71-43-2, Benzene, uses 78-67-1, 2,2'-Azo-  
bis(isobutyronitrile) 96-49-1, Ethylene carbonate 105-58-8,  
Diethyl carbonate 108-32-7, Propylene carbonate 108-67-8,  
Mesitylene, uses 108-86-1, Bromobenzene, uses 108-88-3, Toluene,  
uses 108-90-7, Chlorobenzene, uses 462-06-6, Fluorobenzene  
463-79-6D, Carbonic acid, ester 616-38-6, Dimethyl carbonate  
623-53-0, EthylMethyl carbonate 623-96-1, Dipropyl carbonate  
1330-20-7, Xylene, uses 2094-98-6 4419-11-8,  
2,2'-Azo-bis(2,4-dimethyl valeronitrile) 4437-70-1, 2,3-Butylene  
carbonate 4437-85-8, 1,2-Butylene carbonate 4437-86-9  
7447-41-8, Lithium chloride, uses 7791-03-9,  
Lithium perchlorate 10377-51-2, Lithium  
iodide 14024-11-4, Lithium tetrachloroaluminate

14283-07-9, **Lithium** tetrafluoroborate  
 18424-17-4, **Lithium** hexafluoroantimonate  
 21324-40-3, **Lithium** hexafluorophosphate  
 29935-35-1, **Lithium** hexafluoroarsenate  
 33454-82-9, **Lithium** triflate 35363-40-7,  
 Ethylpropyl carbonate 37220-89-6, Aluminum **lithium** oxide  
 56525-42-9, Methylpropyl carbonate 89489-56-5, 1,2-Pentylene  
 carbonate 90076-65-6 114435-02-8, Fluoroethylene  
 carbonate 131651-65-5  
 (electrolyte for **lithium** secondary  
 battery)

L50 ANSWER 2 OF 6 HCA COPYRIGHT 2007 ACS on STN

142:264348 **Electrolyte** for rechargeable **lithium**

**battery.** Lee, Yong-Beom; Song, Eui-Hwan; Kim, Kwang-Sup;  
 Earmme, Tae-Shik; Kim, You-Mee (Samsung SDI Co., Ltd., S. Korea).  
 Eur. Pat. Appl. EP 1508934 A1 20050223, 32 pp. DESIGNATED STATES:  
 R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT,  
 IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, PL, SK, HR.  
 (English). CODEN: EPXXDW. APPLICATION: EP 2004-90320 20040819.  
 PRIORITY: KR 2003-57716 20030820; KR 2004-5874 20040129.

AB Disclosed is an **electrolyte** for a rechargeable **lithium battery**, including a mixt. of org .  
 solvents including a cyclic solvent and a nitrile-based solvent represented by the formula  
 R-C.tplbond.N (R is from C1-10 aliph. hydrocarbons, C1-10 halogenated aliph.  
 hydrocarbons, C6-10 arom. hydrocarbons, and C6-10 halogenated arom. hydrocarbons)  
 and a **lithium** salt.

IT 94-36-0, Dibenzoyl peroxide, processes 105-74-8,  
 Dilauroyl peroxide 107-71-1, tert-Butylperoxy acetate  
 109-13-7, tert-Butylperoxyisobutyrate 110-22-5,  
 Diacetyl peroxide 614-45-9, tert-Butylperoxy benzoate  
 686-31-7, tert-Amylperoxy 2-ethylhexanoate 927-07-1  
 , tert-Butyl peroxy pivalate 2372-21-6, tert-Butyl peroxy  
 isopropyl carbonate 3006-82-4, tert-Butyl peroxy-2-ethyl  
 hexanoate 3851-87-4, Bis(3,5,5-trimethyl)hexanoyl peroxide  
 13122-18-4, tert-Butylperoxy 3,5,5-trimethylhexanoate  
 15518-51-1, Diethylene glycol bis(tert-butylperoxycarbonate)  
 15520-11-3, Di(4-tert-butylcyclohexyl)peroxydicarbonate  
 26748-38-9, tert-Butyl peroxy neoheptanoate  
 26748-41-4, tert-Butyl peroxy neodecanoate  
 29240-17-3, tert-Amyl peroxy pivalate 34443-12-4,

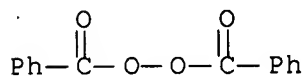


tert-Butyl peroxy 2-ethylhexyl carbonate 36536-42-2,  
 1,6-Hexanediol bis(tert-butyl peroxycarbonate) 51240-95-0,  
 1,1,3,3-Tetramethylbutyl peroxy neodecanoate 52238-68-3,  
 Bis(3-methoxybutyl) peroxydicarbonate 68860-54-8  
**96989-15-0**

(electrolyte for rechargeable lithium  
 battery)

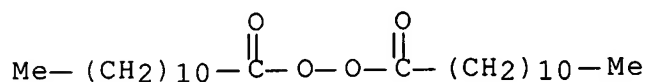
RN 94-36-0 HCA

CN Peroxide, dibenzoyl (CA INDEX NAME)



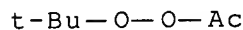
RN 105-74-8 HCA

CN Peroxide, bis(1-oxododecyl) (CA INDEX NAME)



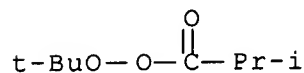
RN 107-71-1 HCA

CN Ethaneperoxoic acid, 1,1-dimethylethyl ester (CA INDEX NAME)



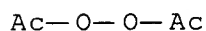
RN 109-13-7 HCA

CN Propaneperoxoic acid, 2-methyl-, 1,1-dimethylethyl ester (CA INDEX  
 NAME)



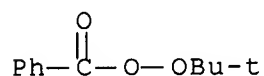
RN 110-22-5 HCA

CN Peroxide, diacetyl (CA INDEX NAME)



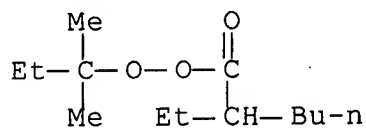
RN 614-45-9 HCA

CN Benzenecarboperoxoic acid, 1,1-dimethylethyl ester (CA INDEX NAME)



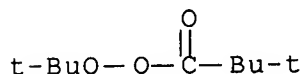
RN 686-31-7 HCA

CN Hexaneperoxoic acid, 2-ethyl-, 1,1-dimethylpropyl ester (CA INDEX NAME)



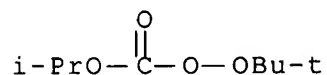
RN 927-07-1 HCA

CN Propaneperoxoic acid, 2,2-dimethyl-, 1,1-dimethylethyl ester (CA INDEX NAME)



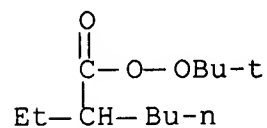
RN 2372-21-6 HCA

CN Carbonoperoxoic acid, OO-(1,1-dimethylethyl) O-(1-methylethyl) ester  
(CA INDEX NAME)



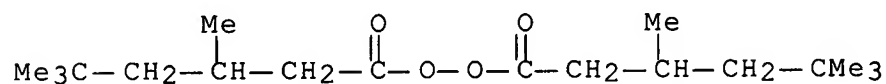
RN 3006-82-4 HCA

CN Hexaneperoxoic acid, 2-ethyl-, 1,1-dimethylethyl ester (CA INDEX NAME)



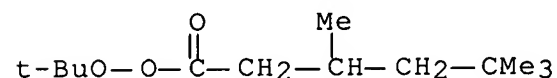
RN 3851-87-4 HCA

CN Peroxide, bis(3,5,5-trimethyl-1-oxohexyl) (CA INDEX NAME)



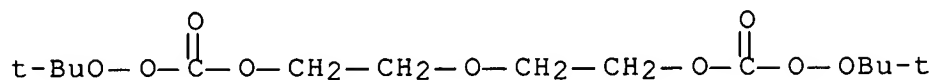
RN 13122-18-4 HCA

CN Hexaneperoxoic acid, 3,5,5-trimethyl-, 1,1-dimethylethyl ester (CA INDEX NAME)



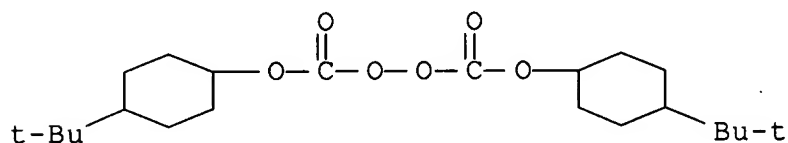
RN 15518-51-1 HCA

CN 2,5,8,10,11-Pentaoxatridecaneperoxoic acid, 12,12-dimethyl-9-oxo-,  
1,1-dimethylethyl ester (CA INDEX NAME)



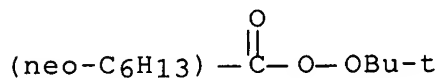
RN 15520-11-3 HCA

CN Peroxydicarbonic acid, C,C'-bis[4-(1,1-dimethylethyl)cyclohexyl]  
ester (CA INDEX NAME)



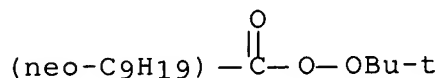
RN 26748-38-9 HCA

CN Neoheptaneperoxoic acid, 1,1-dimethylethyl ester (CA INDEX NAME)



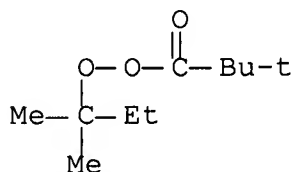
RN 26748-41-4 HCA

CN Neodecaneperoxoic acid, 1,1-dimethylethyl ester (CA INDEX NAME)



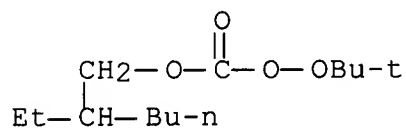
RN 29240-17-3 HCA

CN Propaneperoxoic acid, 2,2-dimethyl-, 1,1-dimethylpropyl ester (CA INDEX NAME)



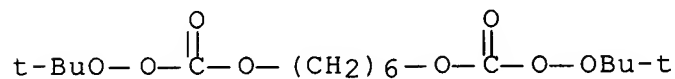
RN 34443-12-4 HCA

CN Carbonoperoxoic acid, OO-(1,1-dimethylethyl) O-(2-ethylhexyl) ester (CA INDEX NAME)



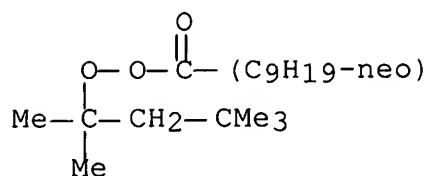
RN 36536-42-2 HCA

CN Carbonoperoxoic acid, O,O'-1,6-hexanediyl OO,OO'-bis(1,1-dimethylethyl) ester (CA INDEX NAME)



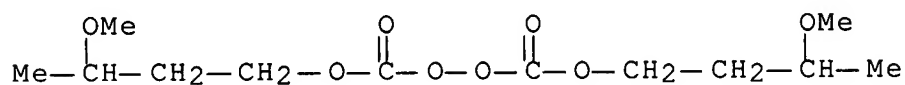
RN 51240-95-0 HCA

CN Neodecaneperoxoic acid, 1,1,3,3-tetramethylbutyl ester (CA INDEX NAME)



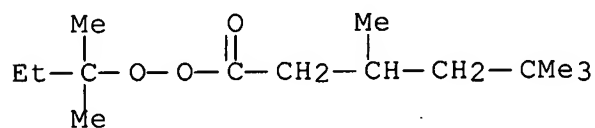
RN 52238-68-3 HCA

CN Peroxydicarbonic acid, C,C'-bis(3-methoxybutyl) ester (CA INDEX NAME)



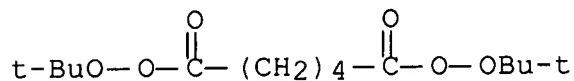
RN 68860-54-8 HCA

CN Hexaneperoxoic acid, 3,5,5-trimethyl-, 1,1-dimethylpropyl ester (CA INDEX NAME)



RN 96989-15-0 HCA

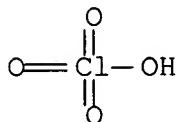
CN Hexanediperoxoic acid, trimethyl-, bis(1,1-dimethylethyl) ester (9CI) (CA INDEX NAME)



IT 7791-03-9, **Lithium perchlorate 14024-11-4**  
 , **Lithium tetrachloroaluminate 14283-07-9**,  
**Lithium tetrafluoroborate 18424-17-4**,  
**Lithium hexafluoroantimonate 21324-40-3**,  
**Lithium hexafluorophosphate 29935-35-1**,  
**Lithium hexafluoroarsenate 33454-82-9**,  
**Lithium triflate 90076-65-6 845717-45-5**  
 (electrolyte for rechargeable lithium  
 battery)

RN 7791-03-9 HCA

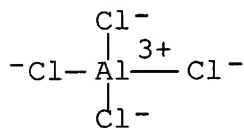
CN Perchloric acid, lithium salt (1:1) (CA INDEX NAME)



● Li

RN 14024-11-4 HCA

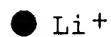
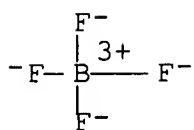
CN Aluminate(1-), tetrachloro-, lithium (1:1), (T-4)- (CA INDEX NAME)



● Li<sup>+</sup>

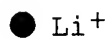
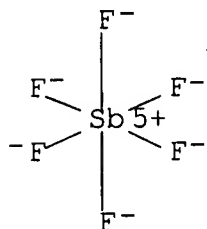
RN 14283-07-9 HCA

CN Borate(1-), tetrafluoro-, lithium (1:1) (CA INDEX NAME)



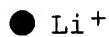
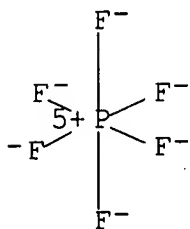
RN 18424-17-4 HCA

CN Antimonate(1-), hexafluoro-, lithium (1:1), (OC-6-11)- (CA INDEX NAME)



RN 21324-40-3 HCA

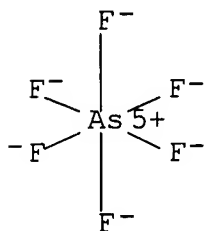
CN Phosphate(1-), hexafluoro-, lithium (1:1) (CA INDEX NAME)





RN 29935-35-1 HCA

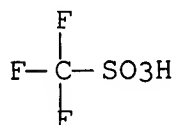
CN Arsenate(1-), hexafluoro-, lithium (1:1) (CA INDEX NAME)



● Li<sup>+</sup>

RN 33454-82-9 HCA

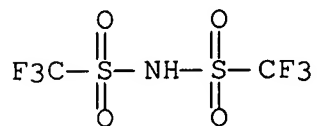
CN Methanesulfonic acid, 1,1,1-trifluoro-, lithium salt (1:1) (CA INDEX NAME)



● Li

RN 90076-65-6 HCA

CN Methanesulfonamide, 1,1,1-trifluoro-N-[(trifluoromethyl)sulfonyl]-, lithium salt (1:1) (CA INDEX NAME)



● Li

RN 845717-45-5 HCA

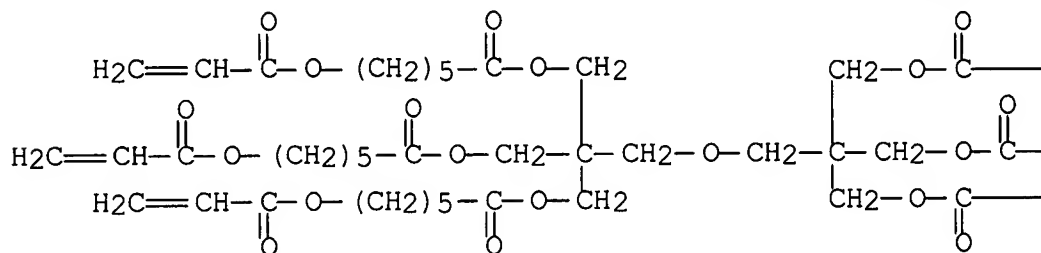
CN Hexanoic acid, 6-[(1-oxo-2-propenyl)oxy]-, 2-[[3-[[1-oxo-6-[(1-oxo-2-propenyl)oxy]hexyl]oxy]-2,2-bis[[[1-oxo-6-[(1-oxo-2-propenyl)oxy]hexyl]oxy]methyl]propoxy]methyl]-2-[[[1-oxo-6-[(1-oxo-2-propenyl)oxy]hexyl]oxy]methyl]-1,3-propanediyl ester, polymer with bis[4-(1,1-dimethylethyl)cyclohexyl] peroxydicarbonate (9CI) (CA INDEX NAME)

CM 1

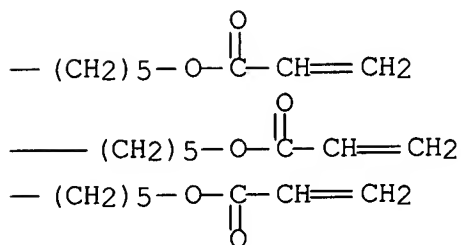
CRN 93294-97-4

CMF C64 H94 O25

PAGE 1-A



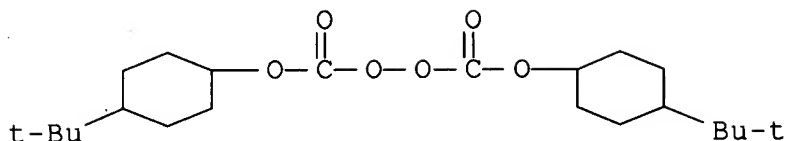
PAGE 1-B



CM 2

CRN 15520-11-3

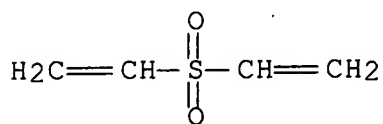
CMF C22 H38 O6



IT 77-77-0, DiVinyl sulfone 105-64-6,  
Di-isopropylperoxydicarbonate 16111-62-9,  
Bis(2-ethylhexyl) peroxydicarbonate 22537-94-6  
(electrolyte for rechargeable lithium  
battery)

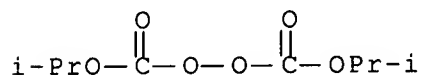
RN 77-77-0 HCA

CN Ethene, 1,1'-sulfonylbis- (CA INDEX NAME)



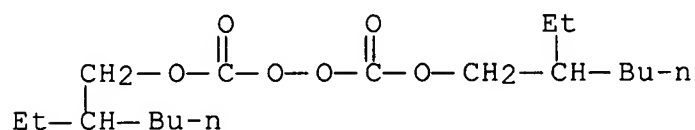
RN 105-64-6 HCA

CN Peroxydicarbonic acid, C,C'-bis(1-methylethyl) ester (CA INDEX  
NAME)



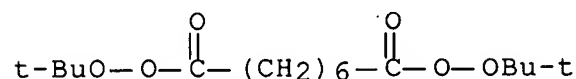
RN 16111-62-9 HCA

CN Peroxydicarbonic acid, C,C'-bis(2-ethylhexyl) ester (CA INDEX NAME)



RN 22537-94-6 HCA

CN Octanediperoxoic acid, bis(1,1-dimethylethyl) ester (9CI) (CA INDEX NAME)



IC ICM H01M010-40

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

Section cross-reference(s): 38

ST **electrolyte rechargeable lithium battery**

IT Nitriles, uses  
(aliph., C1-10; **electrolyte for rechargeable lithium battery**)

IT Nitriles, uses  
(arom., C6-10; **electrolyte for rechargeable lithium battery**)

IT **Battery electrolytes**  
(**electrolyte for rechargeable lithium battery**)

IT Lactones  
(**electrolyte for rechargeable lithium battery**)

IT **Secondary batteries**  
(**lithium; electrolyte for rechargeable lithium battery**)

IT Peroxides, uses

(org.; electrolyte for rechargeable lithium battery)

IT 94-36-0, Dibenzoyl peroxide, processes 105-74-8, Dilauroyl peroxide 107-71-1, tert-Butylperoxy acetate 109-13-7, tert-Butylperoxyisobutyrate 110-22-5, Diacetyl peroxide 614-45-9, tert-Butylperoxy benzoate 686-31-7, tert-Amylperoxy 2-ethylhexanoate 927-07-1, tert-Butyl peroxy pivalate 2372-21-6, tert-Butyl peroxy isopropyl carbonate 3006-82-4, tert-Butyl peroxy-2-ethyl hexanoate 3851-87-4, Bis(3,5,5-trimethyl)hexanoyl peroxide 4419-11-8, 2,2'-Azobis(2,4-dimethylvaleronitrile) 13122-18-4, tert-Butylperoxy 3,5,5-trimethylhexanoate 15518-51-1, Diethylene glycol bis(tert-butylperoxycarbonate) 15520-11-3, Di(4-tert-butylcyclohexyl)peroxydicarbonate 25551-14-8 26748-38-9, tert-Butyl peroxy neoheptanoate 26748-41-4, tert-Butyl peroxy neodecanoate 29240-17-3, tert-Amyl peroxy pivalate 34443-12-4, tert-Butyl peroxy 2-ethylhexyl carbonate 36536-42-2, 1,6-Hexanediol bis(tert-butyl peroxycarbonate) 51240-95-0, 1,1,3,3-Tetramethylbutyl peroxy neodecanoate 51938-28-4, tert-Hexylperoxy pivalate 52238-68-3, Bis(3-methoxybutyl) peroxydicarbonate 68860-54-8 96989-15-0 845717-44-4

(electrolyte for rechargeable lithium battery)

IT 79-20-9, Methyl acetate 96-48-0,  $\gamma$ -Butyrolactone 96-49-1, Ethylene carbonate 105-58-8, Diethyl carbonate 106-70-7, Methyl hexanoate 107-12-0, Propionitrile 107-31-3, Methyl formate 108-29-2,  $\gamma$ -Valerolactone 108-32-7, Propylene carbonate 109-74-0, Butyronitrile 110-59-8, Valeronitrile 124-12-9, Caprylonitrile 140-29-4, Phenylacetone nitrile 141-78-6, Ethyl acetate, uses 326-62-5, 2-FluoroPhenylacetone nitrile 394-47-8, 2-Fluorobenzonitrile 459-22-3, 4-FluoroPhenylacetone nitrile 502-44-3,  $\epsilon$ -Caprolactone 542-28-9,  $\delta$ -Valerolactone 542-52-9, Dibutyl carbonate 616-38-6, Dimethyl carbonate 623-53-0, Ethyl methyl carbonate 623-96-1, Dipropyl carbonate 629-08-3, Heptanenitrile 630-18-2, tert-Butyl cyanide 695-06-7,  $\gamma$ -Caprolactone 766-05-2, Cyclohexanecarbonitrile 1194-02-1, 4-Fluorobenzonitrile 4254-02-8,

Cyclopentanecarbonitrile 4437-85-8, Butylene carbonate 7439-93-2D, **Lithium**, salt 7791-03-9, **Lithium** perchlorate 12190-79-3, Cobalt **lithium** oxide ( $\text{CoLiO}_2$ ) 14024-11-4, **Lithium** tetrachloroaluminate 14283-07-9, **Lithium** tetrafluoroborate 18424-17-4, **Lithium** hexafluoroantimonate 21324-40-3, **Lithium** hexafluorophosphate 29935-35-1, **Lithium** hexafluoroarsenate 33454-82-9, **Lithium** triflate 57381-51-8, 4-Chloro-2-fluoro-benzonitrile 60702-69-4, 2-Chloro-4-fluoro-benzonitrile 90076-65-6 90240-74-7 127813-79-0 132843-44-8 179802-95-0, Cobalt **lithium** manganese nickel oxide ( $\text{Co}_{0.1}\text{LiMn}_{0.1}\text{Ni}_{0.8}\text{O}_2$ ) 845717-45-5 (electrolyte for rechargeable **lithium** battery)

IT 75-05-8, Acetonitrile, uses 77-77-0, DiVinyl sulfone 105-64-6, Di-isopropylperoxydicarbonate 628-73-9, Capronitrile 872-36-6, Vinylene carbonate 3741-38-6, Ethylene sulfite 16111-62-9, Bis(2-ethylhexyl) peroxydicarbonate 22537-94-6 71331-99-2, Bis(4-tert-butylcyclohexyl)peroxycarbonate 114435-02-8, Fluoroethylene carbonate (electrolyte for rechargeable **lithium** battery)

L50 ANSWER 3 OF 6 HCA COPYRIGHT 2007 ACS on STN 140:238483 **Electrolyte for a lithium battery**

. Park, Yong-Chul; Jung, Won-Ii; Kim, Geun-Bae; Cho, Jae-Phil; Jung, Cheol-Soo (S. Korea). U.S. Pat. Appl. Publ. US 2004048163 A1 20040311, 13 pp. (English). CODEN: USXXCO. APPLICATION: US 2003-656086 20030905. PRIORITY: KR 2002-53879 20020906.

AB An electrolyte for a **lithium** battery includes a **nonaq. org. solvent**, a **lithium** salt, and an additive comprising (a) a sulfone-based compd. and (b) a C3-30 org. peroxide or azo-based compd. The **electrolyte** may further include a poly(ester)(meth)acrylate or a polymer that is derived from a (polyester)polyol with at least three hydroxyl (-OH) groups, where a portion or all of the hydroxyl groups are substituted with a (meth)acrylic ester and the remaining hydroxyl groups that are not substituted with the (meth)acrylic ester are substituted with a group having no radical reactivity. The **lithium** battery comprising the **electrolyte** of the present invention has a significantly improved charge-

discharge and cycle life characteristics, recovery capacity ratio at high temp., and swelling inhibition properties.

IT 7791-03-9, Lithium perchlorate 10377-51-2

, Lithium iodide (LiI) 14024-11-4,

Lithium tetrachloroaluminate 14283-07-9,

Lithium tetrafluoroborate 18424-17-4,

Lithium hexafluoroantimonate 21324-40-3,

Lithium hexafluorophosphate 29935-35-1,

Lithium hexafluoroarsenate 33454-82-9,

Lithium triflate 39300-70-4, Lithium

nickel oxide 90076-65-6 131651-65-5,

Lithium nonafluorobutanesulfonate 162684-16-4,

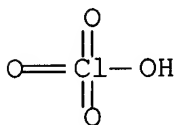
Lithium manganese nickel oxide 193215-00-8, Cobalt

lithiummanganese nickel oxide  $\text{Co}_{0.1}\text{LiMn}_{0.2}\text{Ni}_{0.7}\text{O}_2$

(electrolyte for lithium battery)

RN 7791-03-9 HCA

CN Perchloric acid, lithium salt (1:1) (CA INDEX NAME)



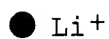
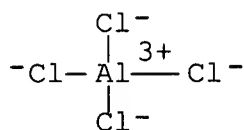
RN 10377-51-2 HCA

CN Lithium iodide (LiI) (CA INDEX NAME)



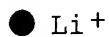
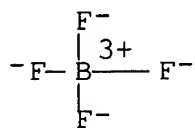
RN 14024-11-4 HCA

CN Aluminate(1-), tetrachloro-, lithium (1:1), (T-4)- (CA INDEX NAME)



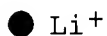
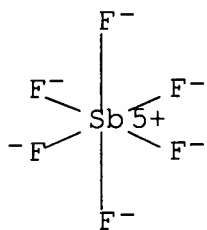
RN 14283-07-9 HCA

CN Borate(1-), tetrafluoro-, lithium (1:1) (CA INDEX NAME)



RN 18424-17-4 HCA

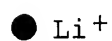
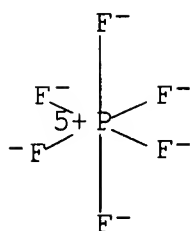
CN Antimonate(1-), hexafluoro-, lithium (1:1), (OC-6-11)- (CA INDEX NAME)



RN 21324-40-3 HCA

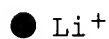
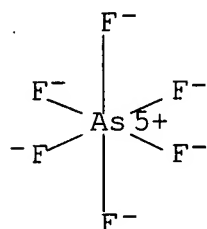
CN Phosphate(1-), hexafluoro-, lithium (1:1) (CA INDEX NAME)





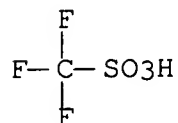
RN 29935-35-1 HCA

CN Arsenate(1-), hexafluoro-, lithium (1:1) (CA INDEX NAME)



RN 33454-82-9 HCA

CN Methanesulfonic acid, 1,1,1-trifluoro-, lithium salt (1:1) (CA INDEX NAME)



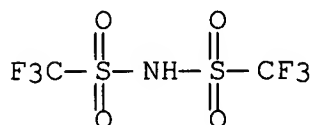
RN 39300-70-4 HCA

CN Lithium nickel oxide (CA INDEX NAME)

Component	Ratio	Component
	Registry Number	
O	x	17778-80-2
Ni	x	7440-02-0
Li	x	7439-93-2

RN 90076-65-6 HCA

CN Methanesulfonamide, 1,1,1-trifluoro-N-[(trifluoromethyl)sulfonyl]-, lithium salt (1:1) (CA INDEX NAME)



● Li

RN 131651-65-5 HCA

CN 1-Butanesulfonic acid, 1,1,2,2,3,3,4,4,4-nonafluoro-, lithium salt (1:1) (CA INDEX NAME)



● Li

RN 162684-16-4 HCA

CN Lithium manganese nickel oxide (CA INDEX NAME)

Component	Ratio	Component
	Registry Number	
O	x	17778-80-2
Ni	x	7440-02-0
Mn	x	7439-96-5
Li	x	7439-93-2

RN 193215-00-8 HCA

CN Cobalt lithium manganese nickel oxide (Co0.1LiMn0.2Ni0.7O2) (9CI)  
(CA INDEX NAME)

Component	Ratio	Component
	Registry Number	
O	2	17778-80-2
Co	0.1	7440-48-4
Ni	0.7	7440-02-0
Mn	0.2	7439-96-5
Li	1	7439-93-2

IT 67-71-0, Methyl sulfone 77-77-0, Vinyl sulfone

78-67-1, 2,2'-Azobisisobutyronitrile

94-36-0, Benzoyl peroxide, uses 105-64-6,

Diisopropyl peroxy dicarbonate 105-74-8, Lauroyl peroxide

127-63-9, Phenyl sulfone 620-32-6, Benzyl sulfone

1561-49-5, Dicyclohexylperoxy dicarbonate 1712-87-4

, m-Toluoyl peroxide 3006-82-4, tert-Butylperoxy-2-ethyl

hexanoate 14666-78-5 15520-11-3,

Bis(4-tert-butylcyclohexyl)peroxy dicarbonate 26748-41-4

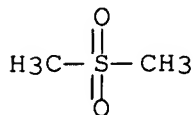
32752-09-3, Isobutyl peroxide 92177-99-6,

3,3,5-Trimethylhexanoyl peroxide

(electrolyte for lithium battery)

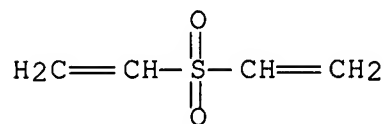
RN 67-71-0 HCA

CN Methane, 1,1'-sulfonylbis- (CA INDEX NAME)



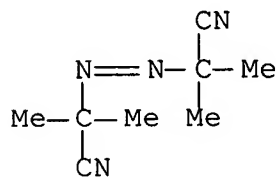
RN 77-77-0 HCA

CN Ethene, 1,1'-sulfonylbis- (CA INDEX NAME)



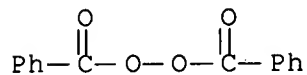
RN 78-67-1 HCA

CN Propanenitrile, 2,2'-(1,2-diazenediyl)bis[2-methyl- (CA INDEX NAME)



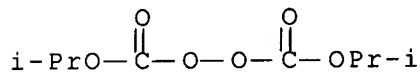
RN 94-36-0 HCA

CN Peroxide, dibenzoyl (CA INDEX NAME)



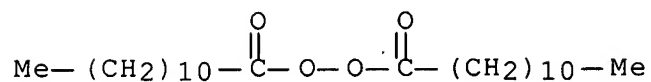
RN 105-64-6 HCA

CN Peroxydicarbonic acid, C,C'-bis(1-methylethyl) ester (CA INDEX NAME)



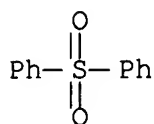
RN 105-74-8 HCA

CN Peroxide, bis(1-oxododecyl) (CA INDEX NAME)



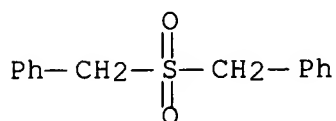
RN 127-63-9 HCA

CN Benzene, 1,1'-sulfonylbis- (CA INDEX NAME)



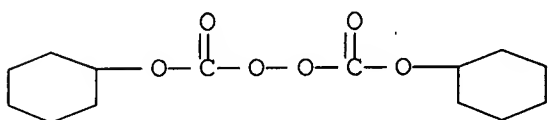
RN 620-32-6 HCA

CN Benzene, 1,1'-[sulfonylbis(methylene)]bis- (CA INDEX NAME)



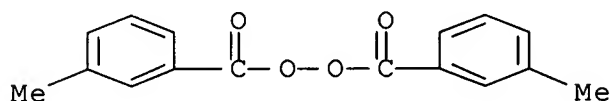
RN 1561-49-5 HCA

CN Peroxydicarbonic acid, C,C'-dicyclohexyl ester (CA INDEX NAME)



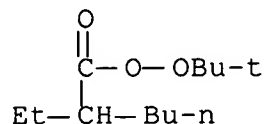
RN 1712-87-4 HCA

CN Peroxide, bis(3-methylbenzoyl) (9CI) (CA INDEX NAME)



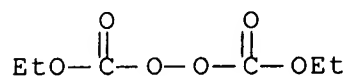
RN 3006-82-4 HCA

CN Hexaneperoxoic acid, 2-ethyl-, 1,1-dimethylethyl ester (CA INDEX NAME)



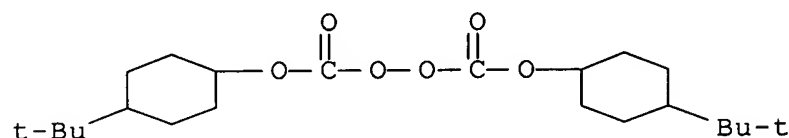
RN 14666-78-5 HCA

CN Peroxydicarbonic acid, diethyl ester (CA INDEX NAME)



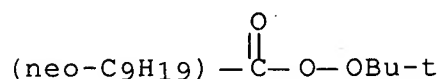
RN 15520-11-3 HCA

CN Peroxydicarbonic acid, C,C'-bis[4-(1,1-dimethylethyl)cyclohexyl] ester (CA INDEX NAME)



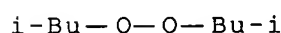
RN 26748-41-4 HCA

CN Neodecaneperoxoic acid, 1,1-dimethylethyl ester (CA INDEX NAME)



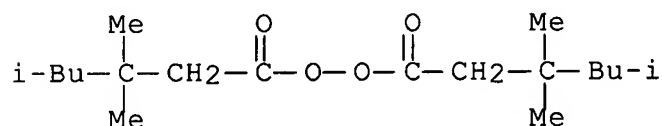
RN 32752-09-3 HCA

CN Peroxide, bis(2-methylpropyl) (CA INDEX NAME)



RN 92177-99-6 HCA

CN Peroxide, bis(3,3,5-trimethyl-1-oxohexyl) (9CI) (CA INDEX NAME)



IC ICM H01M010-40

INCL 429326000; 429329000; 429339000; 429340000

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

Section cross-reference(s): 38

ST **lithium battery electrolyte**

IT **Battery electrolytes**

(**electrolyte for lithium battery**)

IT Aromatic hydrocarbons, uses

Carbonates, uses

Esters, uses

Ethers, uses

- Ketones, uses  
(**electrolyte for lithium battery**)
- IT Azo compounds  
(**electrolyte for lithium battery**)
- IT Carbonaceous materials (technological products)  
(**electrolyte for lithium battery**)
- IT Sulfones  
(**electrolyte for lithium battery**)
- IT Polyesters, uses  
(hydroxy-terminated; **electrolyte for lithium battery**)
- IT Secondary batteries  
(**lithium; electrolyte for lithium battery**)
- IT Polyesters, uses  
(methacrylate; **electrolyte for lithium battery**)
- IT Peroxides, uses  
(org., C3-30; **electrolyte for lithium battery**)
- IT Esters, uses  
(poly-; **electrolyte for lithium battery**)
- IT Imides  
Sulfonic acids, uses  
(sulfonimides, perfluoro derivs., **lithium salts; electrolyte for lithium battery**)
- IT 56-81-5, Glycerol, uses 71-43-2, Benzene, uses 96-49-1, Ethylene carbonate 98-95-3, Nitrobenzene, uses 105-58-8, Diethyl carbonate 108-32-7, Propylene carbonate 108-88-3, Toluene, uses 108-90-7, Chlorobenzene, uses 149-32-6, Erythritol 462-06-6, Fluorobenzene 616-38-6, Dimethyl carbonate 623-53-0, Methylethyl carbonate 623-96-1, Dipropyl carbonate 1330-20-7, Xylene, uses 4437-85-8, Butylene carbonate 7790-99-0, Iodine chloride (ICl) 7791-03-9, **Lithium perchlorate 10377-51-2**, **Lithium iodide (LiI) 14024-11-4**, **Lithium tetrachloroaluminate 14283-07-9**, **Lithium tetrafluoroborate 18424-17-4**, **Lithium hexafluoroantimonate 21324-40-3**, **Lithium hexafluorophosphate 27359-10-0**, Trifluorotoluene



**29935-35-1, Lithium hexafluoroarsenate**  
**33454-82-9, Lithium triflate** 35363-40-7, Ethyl  
propyl carbonate, uses **39300-70-4, Lithium**  
nickel oxide 56525-42-9, Methyl propyl carbonate, uses  
**90076-65-6 131651-65-5, Lithium**  
nonafluorobutanesulfonate **162684-16-4, Lithium**  
manganese nickel oxide **193215-00-8, Cobalt**  
lithiummanganese nickel oxide  $\text{Co}_{0.1}\text{LiMn}_{0.2}\text{Ni}_{0.7}\text{O}_2$   
(electrolyte for lithium battery)

IT 67-71-0, Methyl sulfone 77-77-0, Vinyl sulfone  
**78-67-1, 2,2'-Azobisisobutyronitrile**  
**94-36-0, Benzoyl peroxide, uses 105-64-6,**  
Diisopropyl peroxy dicarbonate **105-74-8, Lauroyl peroxide**  
126-33-0, Tetramethylene sulfone **127-63-9, Phenyl sulfone**  
**620-32-6, Benzyl sulfone 1561-49-5,**  
Dicyclohexylperoxy dicarbonate **1712-87-4, m-Toluoyl**  
peroxide **3006-82-4, tert-Butylperoxy-2-ethyl hexanoate**  
**14666-78-5 15520-11-3, Bis(4-tert-**  
butylcyclohexyl)peroxy dicarbonate **26748-41-4**  
28452-93-9, Butadiene sulfone **32752-09-3, Isobutyl**  
peroxide **92177-99-6, 3,3,5-Trimethylhexanoyl peroxide**  
(electrolyte for lithium battery)

IT 79-10-7DP, Acrylic acid, reaction product with dipentaerythritol and  
 $\epsilon$ -caprolactone and butylcarbonic acid 126-58-9DP,  
Dipentaerythritol, reaction product with  $\epsilon$ -caprolactone and  
acrylic acid and butylcarbonic acid 502-44-3DP,  
 $\epsilon$ -Caprolactone, reaction product with dipentaerythritol and  
acrylic acid and butylcarbonic acid 10411-26-4DP,  
MonoButylcarbonate, reaction product with dipentaerythritol and  
 $\epsilon$ -caprolactone and acrylic acid  
(electrolyte for lithium battery)

L50 ANSWER 4 OF 6 HCA COPYRIGHT 2007 ACS on STN

140:149224 **Nonaqueous electrolytic solution with**  
improved safety for **lithium battery.** Kim,  
Jun-ho; Lee, Ha-young; Choy, Sang-hoon; Kim, Ho-sung (Samsung SDI  
Co., Ltd., S. Korea). U.S. Pat. Appl. Publ. US 2004029018 A1  
20040212, 12 pp. (English). CODEN: USXXCO. APPLICATION: US  
2003-637554 20030811. PRIORITY: KR 2002-47510 20020812.

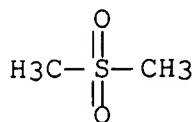
AB A nonaq. electrolytic soln. and a lithium battery employing the same include a lithium salt, an org. solvent, and a halogenated benzene compd. The use of the nonaq. electrolytic soln. causes formation of a polymer by oxidative decompn. of the electrolytic soln. even if a sharp voltage increase occurs due to overcharging of the battery, leading to consumption of an overcharge current, thus protecting the battery.

IT 67-71-0, Methyl sulfone 77-77-0, Vinyl sulfone  
94-36-0, Benzoylperoxide, uses 105-64-6,  
Diisopropyl peroxy dicarbonate 105-74-8, Lauroyl peroxide  
127-63-9, Phenyl sulfone 620-32-6, Benzyl sulfone  
1561-49-5, Dicyclohexyl peroxy dicarbonate 1712-87-4  
, m-Toluoyl peroxide 3006-82-4, tert-Butylperoxy-2-  
ethylhexanoate 14666-78-5 15520-11-3,  
Bis(4-tert-butylcyclohexyl) peroxydicarbonate 21324-40-3,  
Lithium hexafluorophosphate 32752-09-3, Isobutyl  
peroxide 92177-99-6, 3,3,5-Trimethylhexanoylperoxide  
651294-25-6

(nonaq. electrolytic soln. with improved  
safety for lithium battery)

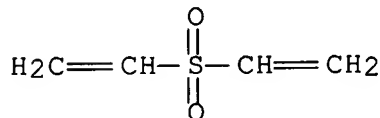
RN 67-71-0 HCA

CN Methane, 1,1'-sulfonylbis- (CA INDEX NAME)



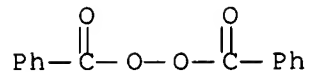
RN 77-77-0 HCA

CN Ethene, 1,1'-sulfonylbis- (CA INDEX NAME)



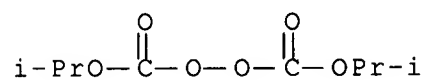
RN 94-36-0 HCA

CN Peroxide, dibenzoyl (CA INDEX NAME)



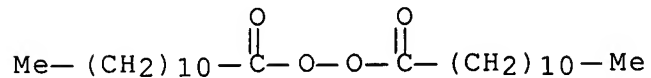
RN 105-64-6 HCA

CN Peroxydicarbonic acid, C,C'-bis(1-methylethyl) ester (CA INDEX NAME)



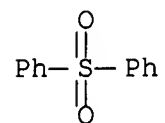
RN 105-74-8 HCA

CN Peroxide, bis(1-oxododecyl) (CA INDEX NAME)



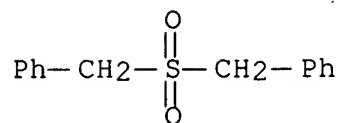
RN 127-63-9 HCA

CN Benzene, 1,1'-sulfonylbis- (CA INDEX NAME)



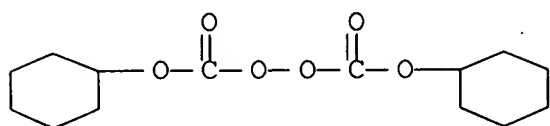
RN 620-32-6 HCA

CN Benzene, 1,1'-[sulfonylbis(methylene)]bis- (CA INDEX NAME)



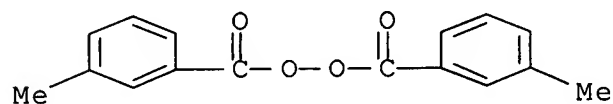
RN 1561-49-5 HCA

CN Peroxydicarbonic acid, C,C'-dicyclohexyl ester (CA INDEX NAME)



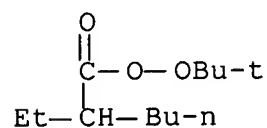
RN 1712-87-4 HCA

CN Peroxide, bis(3-methylbenzoyl) (9CI) (CA INDEX NAME)



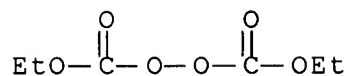
RN 3006-82-4 HCA

CN Hexaneperoxoic acid, 2-ethyl-, 1,1-dimethylethyl ester (CA INDEX NAME)



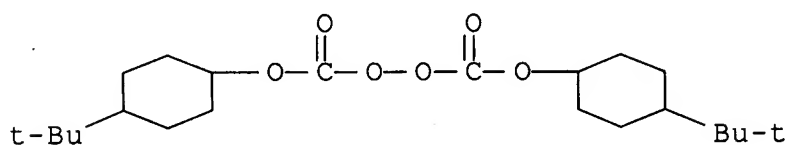
RN 14666-78-5 HCA

CN Peroxydicarbonic acid, diethyl ester (CA INDEX NAME)



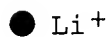
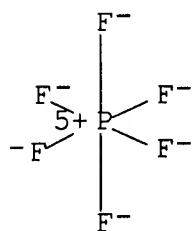
RN 15520-11-3 HCA

CN Peroxydicarbonic acid, C,C'-bis[4-(1,1-dimethylethyl)cyclohexyl]  
ester (CA INDEX NAME)



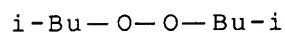
RN 21324-40-3 HCA

CN Phosphate(1-), hexafluoro-, lithium (1:1) (CA INDEX NAME)



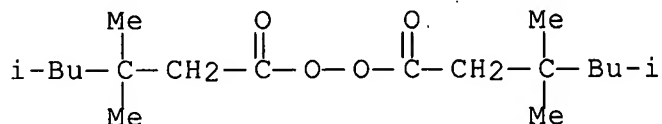
RN 32752-09-3 HCA

CN Peroxide, bis(2-methylpropyl) (CA INDEX NAME)



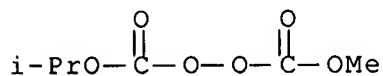
RN 92177-99-6 HCA

CN Peroxide, bis(3,3,5-trimethyl-1-oxohexyl) (9CI) (CA INDEX NAME)



RN 651294-25-6 HCA

CN Peroxydicarbonic acid, methyl 1-methylethyl ester (9CI) (CA INDEX NAME)



IC ICM H01M010-40

INCL 429326000; 429200000; 429340000; 429331000; 429332000

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST **lithium battery nonaq**

**electrolyte soln improved safety**

IT Esters, uses

Ethers, uses

Hydrocarbons, uses

(C1-20; **nonaq. electrolytic soln. with improved safety for lithium battery**)

IT Aromatic hydrocarbons, uses

(C5-20; **nonaq. electrolytic soln. with improved safety for lithium battery**)

IT Secondary batteries

(**lithium; nonaq. electrolytic soln. with improved safety for lithium battery**)

IT Battery electrolytes

(**nonaq. electrolytic soln. with improved safety for lithium battery**)

IT Polyesters, uses

- (**nonaq. electrolytic soln. with improved safety for lithium battery**)
- IT Alcohols, uses  
(polyhydric; **nonaq. electrolytic soln. with improved safety for lithium battery**)
- IT 3087-37-4, Tetrapropyltitanate  
(**nonaq. electrolytic soln. with improved safety for lithium battery**)
- IT 502-44-3,  $\epsilon$ -Caprolactone 7439-93-2D, **Lithium**, salt 12190-79-3, Cobalt **lithium** oxide colio2  
(**nonaq. electrolytic soln. with improved safety for lithium battery**)
- IT 126-58-9DP, Dipentaerythritol, deriv.  
(**nonaq. electrolytic soln. with improved safety for lithium battery**)
- IT 56-81-5, Glycerol, uses 67-71-0, Methyl sulfone 71-43-2D, Benzene, halogenated 77-77-0, Vinyl sulfone 94-36-0, Benzoylperoxide, uses 96-49-1, Ethylene carbonate 105-64-6, Diisopropyl peroxy dicarbonate 105-74-8, Lauroyl peroxide 108-32-7, Propylene carbonate 115-77-5, Pentaerythritol, uses 126-33-0, Tetramethylene sulfone 126-58-9, DiPentaerythritol 127-63-9, Phenyl sulfone 456-55-3, Trifluoromethyl phenyl ether 462-06-6, Fluorobenzene 620-32-6, Benzyl sulfone 623-53-0, Ethyl methyl carbonate 1561-49-5, Dicyclohexyl peroxy dicarbonate 1712-87-4, m-Toluoyl peroxide 2972-19-2 3006-82-4, tert-Butylperoxy-2-ethylhexanoate 9002-88-4, Polyethylene 9003-07-0, Polypropylene 14666-78-5 15520-11-3, Bis(4-tert-butylcyclohexyl) peroxydicarbonate 21151-56-4, Benzene, 1-chloro-4-(chloromethoxy)- 21324-40-3, **Lithium** hexafluorophosphate 28452-93-9, Butadiene sulfone 32752-09-3, Isobutyl peroxide 92177-99-6, 3,3,5-Trimethylhexanoylperoxide 130038-50-5, 2-Propenoic acid, 2-methyl-, ion(1-) homopolymer, uses 651294-25-6 651294-26-7 651294-27-8  
(**nonaq. electrolytic soln. with improved safety for lithium battery**)

to reduce overcharge and improve electrochemical characteristics.

Kim, Jun-Ho; Lee, Ha-Young; Choy, Sang-Hoon; Kim, Ho-Sung; Noh, Hyeong-Gon (Samsung SDI Co., Ltd., S. Korea). U.S. Pat. Appl. Publ.

US 2003190529 A1 20031009, 19 pp. (English). CODEN: USXXCO.

APPLICATION: US 2003-393294 20030321. PRIORITY: KR 2002-18264 20020403.

**AB** An electrolyte for a lithium battery includes a nonaq. org. solvent, a lithium salt, and an additive comprising (a) a compd. represented by the formula  $[(R1)_n C_6 H_{(6-n+m)} (X)_m]$ , and (b) a compd. selected from the group consisting of a sulfone-based compd., a poly(ester)(meth)acrylate, a polymer of poly(ester)(meth)acrylate, and a mixt. thereof: wherein R1 is a C1-10 alkyl, a C 1-10 alkoxy, or a C6-10 aryl, and preferably a Me, Et, or methoxy, X is a halogen, and m and n are integers ranging from 1 to 5, where  $m+n$  is less than or equal to 6.

**IT 7791-03-9, Lithium perchlorate 10377-51-2**

**, Lithium iodide (LiI) 14283-07-9,**

**Lithium tetrafluoroborate 18424-17-4,**

**Lithium hexafluoroantimonate 21324-40-3,**

**Lithium hexafluorophosphate 29935-35-1,**

**Lithium hexafluoroarsenate 33454-82-9,**

**Lithium triflate 90076-65-6 131651-65-5,**

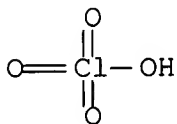
**Lithium perfluorobutanesulfonate**

**(electrolyte for lithium battery to**

**reduce overcharge and improve electrochem. characteristics)**

**RN 7791-03-9 HCA**

**CN Perchloric acid, lithium salt (1:1) (CA INDEX NAME)**



● Li

**RN 10377-51-2 HCA**

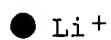
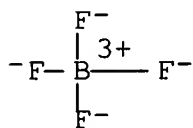
**CN Lithium iodide (LiI) (CA INDEX NAME)**

I—Li



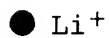
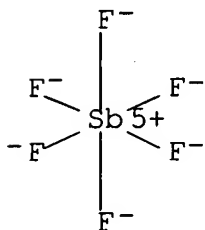
RN 14283-07-9 HCA

CN Borate(1-), tetrafluoro-, lithium (1:1) (CA INDEX NAME)



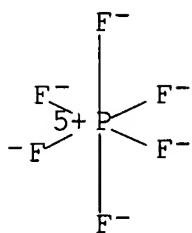
RN 18424-17-4 HCA

CN Antimonate(1-), hexafluoro-, lithium (1:1), (OC-6-11)- (CA INDEX NAME)



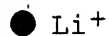
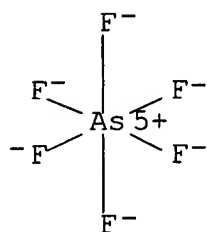
RN 21324-40-3 HCA

CN Phosphate(1-), hexafluoro-, lithium (1:1) (CA INDEX NAME)



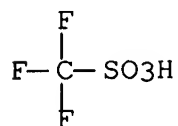
RN 29935-35-1 HCA

CN Arsenate(1-), hexafluoro-, lithium (1:1) (CA INDEX NAME)



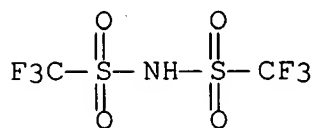
RN 33454-82-9 HCA

CN Methanesulfonic acid, 1,1,1-trifluoro-, lithium salt (1:1) (CA INDEX NAME)



RN 90076-65-6 HCA

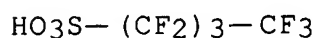
CN Methanesulfonamide, 1,1,1-trifluoro-N-[(trifluoromethyl)sulfonyl]-,  
lithium salt (1:1) (CA INDEX NAME)



● Li

RN 131651-65-5 HCA

CN 1-Butanesulfonic acid, 1,1,2,2,3,3,4,4,4-nonafluoro-, lithium salt  
(1:1) (CA INDEX NAME)

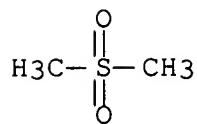


● Li

IT 67-71-0, Methyl sulfone 77-77-0, Vinyl sulfone  
94-36-0, Benzoyl peroxide, uses 105-64-6,  
Diisopropyl peroxy dicarbonate 105-74-8, Lauroyl peroxide  
127-63-9, Phenyl sulfone 620-32-6, Benzyl sulfone  
1561-49-5, Dicyclohexyl peroxy dicarbonate 1712-87-4  
, m-Toluoyl peroxide 3006-82-4, tert-Butylperoxy-2-ethyl-  
hexanoate 14666-78-5 15520-11-3,  
Bis(4-tert-butylcyclohexyl)peroxy dicarbonate 32752-09-3,  
Isobutyl peroxide 92177-99-6, 3,3,5-Trimethylhexanoyl  
peroxide 609365-67-5  
(electrolyte for lithium battery to  
reduce overcharge and improve electrochem. characteristics)

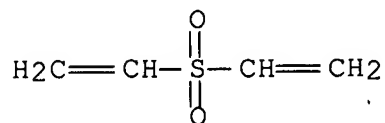
RN 67-71-0 HCA

CN Methane, 1,1'-sulfonylbis- (CA INDEX NAME)



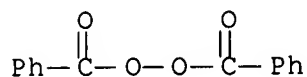
RN 77-77-0 HCA

CN Ethene, 1,1'-sulfonylbis- (CA INDEX NAME)



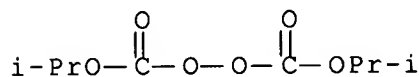
RN 94-36-0 HCA

CN Peroxide, dibenzoyl (CA INDEX NAME)



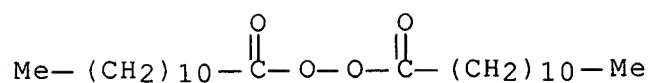
RN 105-64-6 HCA

CN Peroxydicarbonic acid, C,C'-bis(1-methylethyl) ester (CA INDEX NAME)



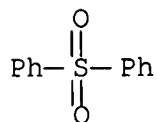
RN 105-74-8 HCA

CN Peroxide, bis(1-oxododecyl) (CA INDEX NAME)



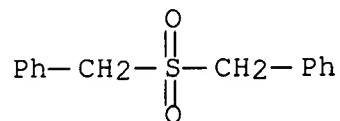
RN 127-63-9 HCA

CN Benzene, 1,1'-sulfonylbis- (CA INDEX NAME)



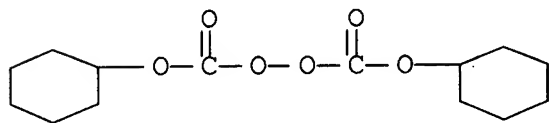
RN 620-32-6 HCA

CN Benzene, 1,1'-[sulfonylbis(methylene)]bis- (CA INDEX NAME)



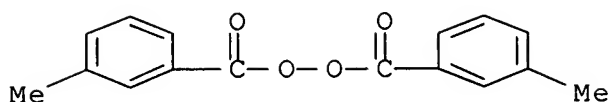
RN 1561-49-5 HCA

CN Peroxydicarbonic acid, C,C'-dicyclohexyl ester (CA INDEX NAME)



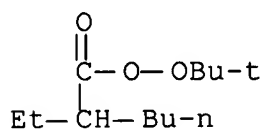
RN 1712-87-4 HCA

CN Peroxide, bis(3-methylbenzoyl) (9CI) (CA INDEX NAME)



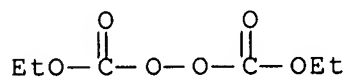
RN 3006-82-4 HCA

CN Hexaneperoxoic acid, 2-ethyl-, 1,1-dimethylethyl ester (CA INDEX NAME)



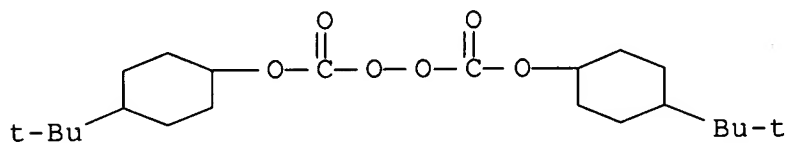
RN 14666-78-5 HCA

CN Peroxydicarbonic acid, diethyl ester (CA INDEX NAME)



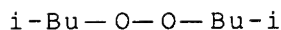
RN 15520-11-3 HCA

CN Peroxydicarbonic acid, C,C'-bis[4-(1,1-dimethylethyl)cyclohexyl] ester (CA INDEX NAME)



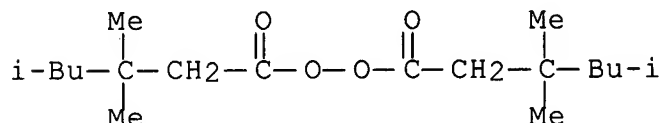
RN 32752-09-3 HCA

CN Peroxide, bis(2-methylpropyl) (CA INDEX NAME)



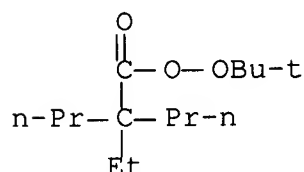
RN 92177-99-6 HCA

CN Peroxide, bis(3,3,5-trimethyl-1-oxohexyl) (9CI) (CA INDEX NAME)



RN 609365-67-5 HCA

CN Pentaneperoxoic acid, 2-ethyl-2-propyl-, 1,1-dimethylethyl ester  
(9CI) (CA INDEX NAME)



IC ICM H01M006-18

INCL 429307000; 429309000; 429326000; 429322000; 429323000; 429330000

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST **lithium battery electrolyte overcharge**  
lowering

IT **Battery electrolytes**  
(**electrolyte for lithium battery to**  
reduce overcharge and improve electrochem. characteristics)

IT **Secondary batteries**  
(**lithium; electrolyte for lithium**  
**battery to reduce overcharge and improve electrochem.**  
characteristics)

IT Peroxides, uses

- (org.; **electrolyte for lithium battery** to reduce overcharge and improve electrochem. characteristics)
- IT Alcohols, uses  
(trihydric; **electrolyte for lithium battery** to reduce overcharge and improve electrochem. characteristics)
- IT 3087-37-4, Tetrapropyltitanate  
(**electrolyte for lithium battery** to reduce overcharge and improve electrochem. characteristics)
- IT 71-43-2, Benzene, uses 96-49-1, Ethylene carbonate 105-58-8, Diethyl carbonate 108-32-7, Propylene carbonate 108-88-3, Toluene, uses 462-06-6, Fluorobenzene 616-38-6, Dimethyl carbonate 623-53-0, Ethyl methyl carbonate 623-96-1, Dipropyl carbonate 1330-20-7, Xylene, uses 4437-85-8, Butylene carbonate 7447-41-8, **Lithium chloride (LiCl)**, uses **7791-03-9**, **Lithium perchlorate 10377-51-2**, **Lithium iodide (LiI) 12355-58-7**, **Lithium aluminate (Li<sub>5</sub>AlO<sub>4</sub>) 14283-07-9**, **Lithium tetrafluoroborate 18424-17-4**, **Lithium hexafluoroantimonate 21324-40-3**, **Lithium hexafluorophosphate 27359-10-0**, Trifluorotoluene **29935-35-1**, **Lithium hexafluoroarsenate 33454-82-9**, **Lithium triflate 35363-40-7**, Ethyl propyl carbonate, uses 56525-42-9, Methyl propyl carbonate, uses **90076-65-6** **131651-65-5**, **Lithium perfluorobutanesulfonate**  
(**electrolyte for lithium battery** to reduce overcharge and improve electrochem. characteristics)
- IT 126-58-9DP, Dipentaerythritol, reaction product with  $\epsilon$ -caprolactone 502-44-3DP,  $\epsilon$ -Caprolactone, reaction product with dipentaerythritol 609772-45-4P  
(**electrolyte for lithium battery** to reduce overcharge and improve electrochem. characteristics)
- IT 56-81-5, Glycerol, uses 67-71-0, Methyl sulfone 77-77-0, Vinyl sulfone 79-10-7D, Acrylic acid,  $\omega$ -fatty acid esters C2-C21 79-41-4D, Methacrylic acid,  $\omega$ -fatty acid esters C2-C21 **94-36-0**, Benzoyl peroxide, uses 104-92-7, 4-Bromoanisole **105-64-6**, Diisopropyl peroxy dicarbonate **105-74-8**, Lauroyl peroxide



126-33-0, Tetramethylene sulfone 127-63-9, Phenyl sulfone  
149-32-6, Erythritol 452-10-8, 2,4-Difluoroanisole 456-49-5,  
3-Fluoroanisole 459-60-9, 4-Fluoroanisole 620-32-6,  
Benzyl sulfone 623-12-1, 4-Chloroanisole 1561-49-5,  
Dicyclohexyl peroxy dicarbonate 1712-87-4, m-Toluoyl  
peroxide 2398-37-0, 3-Bromoanisole 2845-89-8, 3-Chloroanisole  
3006-82-4, tert-Butylperoxy-2-ethyl-hexanoate  
14666-78-5 15520-11-3, Bis(4-tert-  
butylcyclohexyl)peroxy dicarbonate 28452-93-9, Butadiene sulfone  
32752-09-3, Isobutyl peroxide 92177-99-6,  
3,3,5-Trimethylhexanoyl peroxide 93343-10-3, 3,5-Difluoroanisole  
202925-08-4, 3-Chloro-5-fluoroanisole 609365-67-5  
(electrolyte for lithium battery to  
reduce overcharge and improve electrochem. characteristics)

L50 ANSWER 6 OF 6 HCA COPYRIGHT 2007 ACS on STN

126:114265 Toxicity assessment of the samples from water environment  
using cultured mammalian cells. Kunimoto, Manabu; Yasuhara, Akio;  
Soma, Yuko; Nakasugi, Osami (Environmental Health Sciences Division,  
National Institute Environmental Studies, Tsukuba, 305, Japan).  
Mizu Kankyo Gakkaishi, 19(11), 855-860 (English) 1996. CODEN:  
MKGAEY. ISSN: 0916-8958. Publisher: Nippon Mizu Kankyo Gakkai.

AB To evaluate the toxicity other than mutagenicity or carcinogenicity present in the water  
environment, in vitro cytotoxicity tests using cultured mammalian cells were utilized.  
Cytotoxicity was estd. based on the changes in viable cell nos. of **primary** rat cerebellar  
**cells**, rat pheochromocytoma cell PC 12h, and normal rat kidney epithelial cell NRK-  
52E. Evaluation of these in vitro systems was performed by testing ref. chems. proposed  
by MEIC (Multicenter Evaluation of In Vitro Cytotoxicity), an international program for  
the validation of in vitro cytotoxicity tests. When cells in culture were exposed to  
landfill leachate for 48 h, viable cell nos. decreased dose dependently. However,  
fractions prepd. by condensation and extn. from the leachates showed much less effects  
on the viable cell nos. Their individual cytotoxicity did not account for that of  
unfractionated leachate, suggesting that component(s) with higher cytotoxicity may not  
be successfully recovered during the condensation and extn. process. Among the silica-  
gel column fractions of acetone-exts. of sediment samples, fractions eluted with acetone  
showed the highest cytotoxicity. These results indicate that the cytotoxicity of water  
samples like landfill leachates or of their exts. can be detected with the present assay  
system but toxic components may not be recovered quant. during the condensation and  
extn. process.

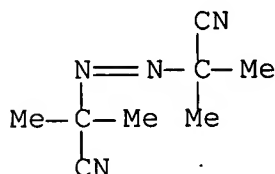
IT 78-67-1,  $\alpha,\alpha'$ -Azobis(isobutyronitrile)

**3112-85-4, Methyl phenyl sulfone**

(toxicity assessment of the samples from water environment using  
cultured mammalian cells)

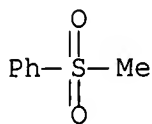
RN 78-67-1 HCA

CN Propanenitrile, 2,2'-(1,2-diazenediyl)bis[2-methyl- (CA INDEX NAME)



RN 3112-85-4 HCA

CN Benzene, (methylsulfonyl)- (CA INDEX NAME)



**CC 4-1 (Toxicology)**

Section cross-reference(s): 61

IT 50-06-6, Phenobarbital, biological studies 50-48-6, Amitriptyline  
50-54-4, Quinidine sulfate 50-63-5, Chloroquine phosphate  
50-78-2, Acetyl salicylic acid 54-11-5, Nicotine 54-85-3,  
Isoniazid 55-48-1, Atropine sulfate 56-23-5, biological studies  
56-75-7, Chloramphenicol 57-41-0, Phenytoin 58-08-2, Caffeine,  
biological studies 58-55-9, Theophylline, biological studies  
58-89-9, Lindane 60-13-9, Amphetamine sulfate 62-76-0, Sodium  
oxalate 64-17-5, Ethanol, biological studies 67-56-1, Methanol,  
biological studies 67-63-0, Isopropyl alcohol, biological studies  
67-66-3, Chloroform, biological studies 70-30-4, Hexachlorophene  
71-55-6, 1,1,1-Trichloroethane 75-09-2, Dichloromethane,  
biological studies 78-67-1,  $\alpha,\alpha'$ -  
Azobis(isobutyronitrile) 81-81-2, Warfarin 84-74-2, Dibutyl  
phthalate 87-86-5, Pentachlorophenol 94-75-7, biological studies

103-90-2 106-46-7, 1,4-Dichlorobenzene 107-21-1, 1,2-Ethanediol,  
 biological studies 108-95-2, Phenol, biological studies  
 110-67-8, 3-Methoxypropanenitrile 110-88-3, Trioxane, biological  
 studies 111-76-2, 2-Butoxyethanol 112-49-2, Triethylene glycol  
 dimethyl ether 115-96-8, Tris(2-chloroethyl)phosphate 121-75-5  
 123-91-1, 1,4-Dioxane, biological studies 127-19-5 130-61-0,  
 Thioridazine hydrochloride 151-50-8, Potassium cyanide 152-11-4,  
 Verapamil hydrochloride 318-98-9, Propranolol hydrochloride  
 341-69-5, Orphenadrine hydrochloride 439-14-5, Diazepam  
 469-62-5, Dextropropoxyphene 615-58-7, 2,4-Dibromophenol  
 632-22-4, Tetramethylurea 1327-53-3, Arsenic trioxide 1330-20-7,  
 Xylene, biological studies **3112-85-4**, Methyl phenyl  
 sulfone 4320-85-8 4685-14-7, Paraquat 6970-56-5 7326-46-7,  
 Tetrahydro-2-methyl-2-furanol 7446-18-6, Thallium sulfate  
 7447-40-7, Potassium chloride, biological studies 7487-94-7,  
 Mercuric chloride, biological studies 7647-14-5, Sodium chloride  
 (NaCl), biological studies 7681-49-4, Sodium fluoride, biological  
 studies 7720-78-7, Ferrous sulfate 7758-98-7, Cupric sulfate,  
 biological studies 10022-31-8, Barium nitrate 10377-48-7,  
**Lithium** sulfate 13423-22-8 20830-75-5, Digoxin  
 37306-44-8, Triazole 53778-61-3 54063-15-9 74498-88-7,  
 1-Methoxy-2-(methoxymethoxy)ethane  
 (toxicity assessment of the samples from water environment using  
 cultured mammalian cells)

=>

(1111) W. S. Park

=> D L56 1-4 CBIB ABS HITSTR HITIND

L56 ANSWER 1 OF 4 HCA COPYRIGHT 2007 ACS on STN

145:457647 Polymer **electrolyte** for a **lithium**

secondary **battery**. Lee, Yong-Beom; Cheong, Kwang-Jo;

Song, Eui-Hwan (Samsung Sdi Co., Ltd., S. Korea). Eur. Pat. Appl.

EP 1715542 A1 20061025, 22pp. DESIGNATED STATES: R: AT, BE, CH,

DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV,

FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, PL, SK, BA, HR, IS, YU.

(English). CODEN: EPXXDW. APPLICATION: EP 2006-112896 20060421.

PRIORITY: KR 2005-33084 20050421.

AB The invention relates to a polymer **electrolyte** for a **lithium** secondary **battery**. The polymer **electrolyte** comprises: a **non-aq. org. solvent**; a **lithium** salt; and a polymer being obtained by polymn. of at least one monomer represented by: A-**polyester polyol**-B, wherein the **polyester polyol** is being obtained by condensation of at least one alc. having from 2 to 6 OH groups and at least one dicarboxylic acid, the **polyester polyol** having a wt. av. mol. wt. ranging from about 100 to about 10,000,000, and each of A and B are linked to terminal OH groups of the **polyester polyol**, each of A and B being selected from the group consisting of CH<sub>2</sub>=CR-C(=O)-, CH<sub>2</sub>=CR-O-CH<sub>2</sub>-, CH<sub>2</sub>=CR-, CH<sub>2</sub>=CR-O-C(=O)-, CH<sub>2</sub>=CH-CH<sub>2</sub>-O-, CH<sub>2</sub>=CH-S(=O)<sub>2</sub>-, and CH<sub>2</sub>=CR-C(=O)-O-CH<sub>2</sub>CH<sub>2</sub>-NH-C(=O)-, wherein R is selected from the group consisting of C<sub>1</sub> to C<sub>10</sub> hydrocarbons and C<sub>6</sub> to C<sub>10</sub> arom. hydrocarbons.

IT 7791-03-9, **Lithium perchlorate** 14024-11-4

, **Lithium tetrachloroaluminate** 14283-07-9,

**Lithium tetrafluoroborate** 18424-17-4,

**Lithium hexafluoroantimonate** 21324-40-3,

**Lithium hexafluorophosphate** 29935-35-1,

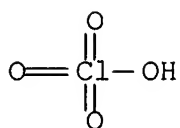
**Lithium hexafluoroarsenate** 33454-82-9,

**Lithium triflate** 90076-65-6

(polymer **electrolyte** for **lithium** secondary **battery**)

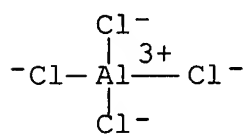
RN 7791-03-9 HCA

CN Perchloric acid, lithium salt (1:1) (CA INDEX NAME)



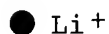
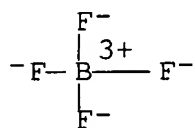
RN 14024-11-4 HCA

CN Aluminate(1-), tetrachloro-, lithium (1:1), (T-4)- (CA INDEX NAME)



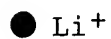
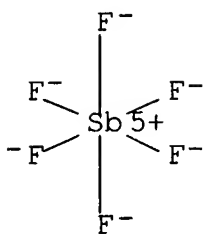
RN 14283-07-9 HCA

CN Borate(1-), tetrafluoro-, lithium (1:1) (CA INDEX NAME)



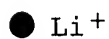
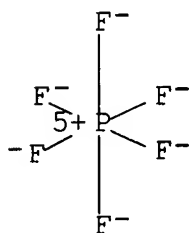
RN 18424-17-4 HCA

CN Antimonate(1-), hexafluoro-, lithium (1:1), (OC-6-11)- (CA INDEX NAME)



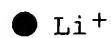
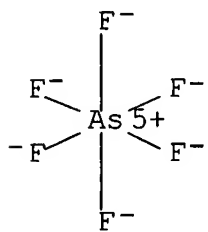
RN 21324-40-3 HCA

CN Phosphate(1-), hexafluoro-, lithium (1:1) (CA INDEX NAME)



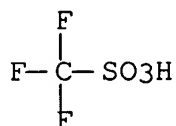
RN 29935-35-1 HCA

CN Arsenate(1-), hexafluoro-, lithium (1:1) (CA INDEX NAME)



RN 33454-82-9 HCA

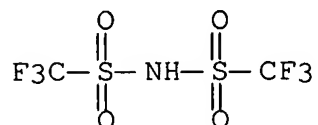
CN Methanesulfonic acid, 1,1,1-trifluoro-, lithium salt (1:1) (CA INDEX NAME)



● Li

RN 90076-65-6 HCA

CN Methanesulfonamide, 1,1,1-trifluoro-N-[(trifluoromethyl)sulfonyl]-, lithium salt (1:1) (CA INDEX NAME)

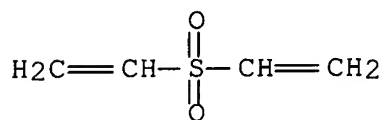


● Li

IT 77-77-0, Divinylsulfone  
(polymer **electrolyte** for **lithium** secondary  
**battery**)

RN 77-77-0 HCA

CN Ethene, 1,1'-sulfonylbis- (CA INDEX NAME)



CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

Section cross-reference(s): 38

ST **polymer electrolyte lithium secondary battery**

IT Intercalation compounds  
(**lithiated**; **polymer electrolyte for lithium secondary battery**)

IT Secondary batteries  
(**lithium**; **polymer electrolyte for lithium secondary battery**)

IT **Battery electrolytes**  
Shear strength  
(**polymer electrolyte for lithium secondary battery**)

IT Aromatic hydrocarbons, uses  
Carbonaceous materials (technological products)  
Esters, uses  
Ethers, uses  
Ketones, uses  
Nitriles, uses  
(**polymer electrolyte for lithium secondary battery**)

IT 51938-28-4  
(**polymer electrolyte for lithium secondary battery**)

IT 71-43-2, Benzene, uses 96-49-1, Ethylene carbonate 108-32-7, Propylene carbonate 108-88-3, Toluene, uses 462-06-6, Fluorobenzene 463-79-6D, Carbonic acid, ester 623-53-0, Ethyl methyl carbonate 1330-20-7, Xylene, uses 7791-03-9, **Lithium perchlorate 14024-11-4, Lithium tetrachloroaluminate 14283-07-9, Lithium tetrafluoroborate 18424-17-4, Lithium hexafluoroantimonate 21324-40-3, Lithium hexafluorophosphate 25496-08-6, Fluorotoluene 27359-10-0, Trifluorotoluene 29935-35-1, Lithium hexafluoroarsenate 33454-82-9, Lithium triflate 37220-89-6, Aluminum lithium oxide 90076-65-6 132843-44-8 244761-29-3, Lithium bisoxalatoborate**



913531-20-1 913531-22-3 913531-23-4 913531-24-5

(polymer electrolyte for lithium secondary battery)

IT 77-77-0, Divinylsulfone 872-36-6, Vinylene carbonate  
3741-38-6, Ethylene sulfite 114435-02-8, Fluoroethylene carbonate  
827300-14-1 827300-17-4

(polymer electrolyte for lithium secondary battery)

IT 9010-89-3P, Adipic acid-diethylene glycol copolymer 85214-48-8DP,  
Adipic acid-diethylene glycol-ethylene glycol-trimethylolpropane  
copolymer, reaction product with isocynoethyl methacrylate  
85214-48-8P, Adipic acid-diethylene glycol-ethylene  
glycol-trimethylolpropane copolymer

(polymer electrolyte for lithium secondary battery)

L56 ANSWER 2 OF 4 HCA COPYRIGHT 2007 ACS on STN

140:238483 Electrolyte for a lithium battery

. Park, Yong-Chul; Jung, Won-Ii; Kim, Geun-Bae; Cho, Jae-Phil;  
Jung, Cheol-Soo (S. Korea). U.S. Pat. Appl. Publ. US 2004048163 A1  
20040311, 13 pp. (English). CODEN: USXXCO. APPLICATION: US  
2003-656086 20030905. PRIORITY: KR 2002-53879 20020906.

AB An electrolyte for a lithium battery includes a nonaq. org. solvent, a lithium salt, and an additive comprising (a) a sulfone-based compd. and (b) a C3-30 org. peroxide or azo-based compd. The electrolyte may further include a poly( ester)(meth)acrylate or a polymer that is derived from a ( polyester)polyol with at least three hydroxyl (-OH) groups, where a portion or all of the hydroxyl groups are substituted with a (meth)acrylic ester and the remaining hydroxyl groups that are not substituted with the (meth)acrylic ester are substituted with a group having no radical reactivity. The lithium battery comprising the electrolyte of the present invention has a significantly improved charge-discharge and cycle life characteristics, recovery capacity ratio at high temp., and swelling inhibition properties.

IT 56-81-5, Glycerol, uses 7791-03-9, Lithium perchlorate 10377-51-2, Lithium iodide (LiI)  
14024-11-4, Lithium tetrachloroaluminate  
14283-07-9, Lithium tetrafluoroborate  
18424-17-4, Lithium hexafluoroantimonate  
21324-40-3, Lithium hexafluorophosphate  
29935-35-1, Lithium hexafluoroarsenate  
33454-82-9, Lithium triflate 39300-70-4,

**Lithium nickel oxide 90076-65-6**

**131651-65-5, Lithium nonafluorobutanesulfonate**

**162684-16-4, Lithium manganese nickel oxide**

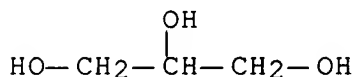
**193215-00-8, Cobalt lithiummanganese nickel oxide**

**Co<sub>0.1</sub>LiMn<sub>0.2</sub>Ni<sub>0.7</sub>O<sub>2</sub>**

**(electrolyte for lithium battery)**

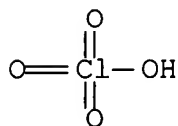
RN 56-81-5 HCA

CN 1,2,3-Propanetriol (CA INDEX NAME)



RN 7791-03-9 HCA

CN Perchloric acid, lithium salt (1:1) (CA INDEX NAME)



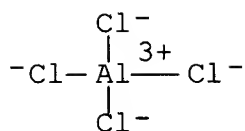
RN 10377-51-2 HCA

CN Lithium iodide (LiI) (CA INDEX NAME)



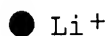
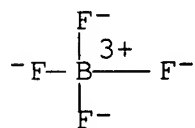
RN 14024-11-4 HCA

CN Aluminate(1-), tetrachloro-, lithium (1:1), (T-4)- (CA INDEX NAME)



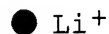
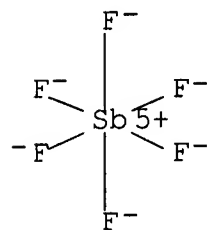
RN 14283-07-9 HCA

CN Borate(1-), tetrafluoro-, lithium (1:1) (CA INDEX NAME)



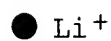
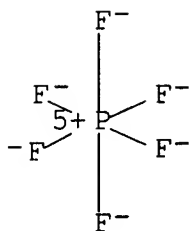
RN 18424-17-4 HCA

CN Antimonate(1-), hexafluoro-, lithium (1:1), (OC-6-11)- (CA INDEX NAME)



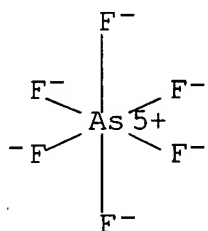
RN 21324-40-3 HCA

CN Phosphate(1-), hexafluoro-, lithium (1:1) (CA INDEX NAME)



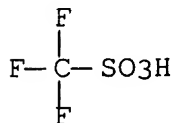
RN 29935-35-1 HCA

CN Arsenate(1-), hexafluoro-, lithium (1:1) (CA INDEX NAME)



RN 33454-82-9 HCA

CN Methanesulfonic acid, 1,1,1-trifluoro-, lithium salt (1:1) (CA INDEX NAME)



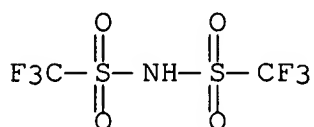
RN 39300-70-4 HCA

CN Lithium nickel oxide (CA INDEX NAME)

Component	Ratio	Component
	Registry Number	
O	x	17778-80-2
Ni	x	7440-02-0
Li	x	7439-93-2

RN 90076-65-6 HCA

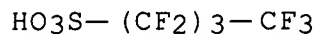
CN Methanesulfonamide, 1,1,1-trifluoro-N-[(trifluoromethyl)sulfonyl]-, lithium salt (1:1) (CA INDEX NAME)



● Li

RN 131651-65-5 HCA

CN 1-Butanesulfonic acid, 1,1,2,2,3,3,4,4,4-nonafluoro-, lithium salt (1:1) (CA INDEX NAME)



● Li

RN 162684-16-4 HCA

CN Lithium manganese nickel oxide (CA INDEX NAME)

Component	Ratio	Component
	Registry Number	
O	x	17778-80-2
Ni	x	7440-02-0
Mn	x	7439-96-5
Li	x	7439-93-2

RN 193215-00-8 HCA

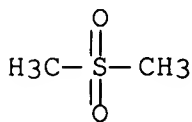
CN Cobalt lithium manganese nickel oxide (Co<sub>0.1</sub>LiMn<sub>0.2</sub>Ni<sub>0.7</sub>O<sub>2</sub>) (9CI)  
(CA INDEX NAME)

Component	Ratio	Component
	Registry Number	
O	2	17778-80-2
Co	0.1	7440-48-4
Ni	0.7	7440-02-0
Mn	0.2	7439-96-5
Li	1	7439-93-2

IT 67-71-0, Methyl sulfone 77-77-0, Vinyl sulfone  
127-63-9, Phenyl sulfone 620-32-6, Benzyl sulfone  
(electrolyte for lithium battery)

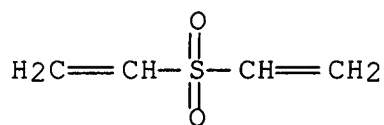
RN 67-71-0 HCA

CN Methane, 1,1'-sulfonylbis- (CA INDEX NAME)



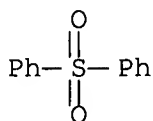
RN 77-77-0 HCA

CN Ethene, 1,1'-sulfonylbis- (CA INDEX NAME)



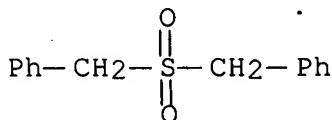
RN 127-63-9 HCA

CN Benzene, 1,1'-sulfonylbis- (CA INDEX NAME)



RN 620-32-6 HCA

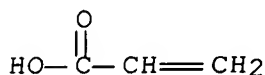
CN Benzene, 1,1'-[sulfonylbis(methylene)]bis- (CA INDEX NAME)



IT 79-10-7DP, Acrylic acid, reaction product with  
dipentaerythritol and ε-caprolactone and butylcarbonic acid  
126-58-9DP, Dipentaerythritol, reaction product with  
ε-caprolactone and acrylic acid and butylcarbonic acid  
(electrolyte for lithium battery)

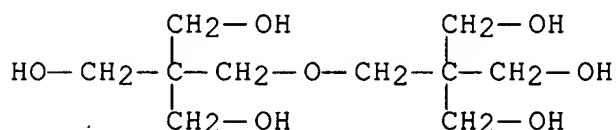
RN 79-10-7 HCA

CN 2-Propenoic acid (CA INDEX NAME)



RN 126-58-9 HCA

CN 1,3-Propanediol, 2,2'-[oxybis(methylene)]bis[2-(hydroxymethyl)- (CA  
INDEX NAME)



IC ICM H01M010-40

INCL 429326000; 429329000; 429339000; 429340000

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

Section cross-reference(s): 38

ST **lithium battery electrolyte**

IT **Battery electrolytes**

(**electrolyte for lithium battery**)

IT Aromatic hydrocarbons, uses

Carbonates, uses

Esters, uses

Ethers, uses

Ketones, uses

(**electrolyte for lithium battery**)

IT Azo compounds

(**electrolyte for lithium battery**)

IT Carbonaceous materials (technological products)

(**electrolyte for lithium battery**)

IT Sulfones

(**electrolyte for lithium battery**)

IT Polyesters, uses

(hydroxy-terminated; **electrolyte for lithium battery**)

IT Secondary batteries

(**lithium; electrolyte for lithium battery**)

IT Polyesters, uses

(methacrylate; **electrolyte for lithium**



- battery)**
- IT Peroxides, uses  
(org., C3-30; **electrolyte for lithium battery**)
- IT Esters, uses  
(poly-; **electrolyte for lithium battery**)
- IT Imides
- Sulfonic acids, uses  
(sulfonimides, perfluoro derivs., **lithium salts; electrolyte for lithium battery**)
- IT **56-81-5**, Glycerol, uses 71-43-2, Benzene, uses 96-49-1, Ethylene carbonate 98-95-3, Nitrobenzene, uses 105-58-8, Diethyl carbonate 108-32-7, Propylene carbonate 108-88-3, Toluene, uses 108-90-7, Chlorobenzene, uses 149-32-6, Erythritol 462-06-6, Fluorobenzene 616-38-6, Dimethyl carbonate 623-53-0, Methylethyl carbonate 623-96-1, Dipropyl carbonate 1330-20-7, Xylene, uses 4437-85-8, Butylene carbonate 7790-99-0, Iodine chloride (ICl) 7791-03-9, **Lithium perchlorate 10377-51-2**, **Lithium iodide (LiI) 14024-11-4**, **Lithium tetrachloroaluminate 14283-07-9**, **Lithium tetrafluoroborate 18424-17-4**, **Lithium hexafluoroantimonate 21324-40-3**, **Lithium hexafluorophosphate 27359-10-0**, Trifluorotoluene 29935-35-1, **Lithium hexafluoroarsenate 33454-82-9**, **Lithium triflate 35363-40-7**, Ethyl propyl carbonate, uses 39300-70-4, **Lithium nickel oxide 56525-42-9**, Methyl propyl carbonate, uses 90076-65-6 131651-65-5, **Lithium nonafluorobutanesulfonate 162684-16-4**, **Lithium manganese nickel oxide 193215-00-8**, Cobalt lithiummanganese nickel oxide  $\text{Co}_{0.1}\text{LiMn}_{0.2}\text{Ni}_{0.7}\text{O}_2$  (**electrolyte for lithium battery**)
- IT 67-71-0, Methyl sulfone 77-77-0, Vinyl sulfone 78-67-1, 2,2'-Azobisisobutyronitrile 94-36-0, Benzoyl peroxide, uses 105-64-6, Diisopropyl peroxy dicarbonate 105-74-8, Lauroyl peroxide 126-33-0, Tetramethylene sulfone 127-63-9, Phenyl sulfone 620-32-6, Benzyl sulfone 1561-49-5, Dicyclohexylperoxy dicarbonate 1712-87-4, m-Toluoyl peroxide 3006-82-4, tert-Butylperoxy-2-ethyl hexanoate 14666-78-5

15520-11-3, Bis(4-tert-butylcyclohexyl)peroxy dicarbonate  
26748-41-4 28452-93-9, Butadiene sulfone 32752-09-3, Isobutyl  
peroxide 92177-99-6, 3,3,5-Trimethylhexanoyl peroxide  
(electrolyte for lithium battery)

IT 79-10-7DP, Acrylic acid, reaction product with  
dipentaerythritol and ε-caprolactone and butylcarbonic acid  
126-58-9DP, Dipentaerythritol, reaction product with  
ε-caprolactone and acrylic acid and butylcarbonic acid  
502-44-3DP, ε-Caprolactone, reaction product with  
dipentaerythritol and acrylic acid and butylcarbonic acid  
10411-26-4DP, MonoButylcarbonate, reaction product with  
dipentaerythritol and ε-caprolactone and acrylic acid  
(electrolyte for lithium battery)

L56 ANSWER 3 OF 4 HCA COPYRIGHT 2007 ACS on STN

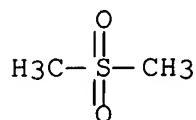
140:149224 **Nonaqueous electrolytic** solution with  
improved safety for **lithium battery**. Kim,  
Jun-ho; Lee, Ha-young; Choy, Sang-hoon; Kim, Ho-sung (Samsung SDI  
Co., Ltd., S. Korea). U.S. Pat. Appl. Publ. US 2004029018 A1  
20040212, 12 pp. (English). CODEN: USXXCO. APPLICATION: US  
2003-637554 20030811. PRIORITY: KR 2002-47510 20020812.

AB A **nonaq. electrolytic soln.** and a **lithium battery** employing the same include a **lithium**  
salt, an **org. solvent**, and a halogenated benzene compd. The use of the **nonaq.**  
**electrolytic soln.** causes formation of a polymer by oxidative decompn. of the  
**electrolytic soln.** even if a sharp voltage increase occurs due to overcharging of the  
**battery**, leading to consumption of an overcharge current, thus protecting the **battery**.

IT 67-71-0, Methyl sulfone 77-77-0, Vinyl sulfone  
127-63-9, Phenyl sulfone 620-32-6, Benzyl sulfone  
21324-40-3, **Lithium hexafluorophosphate**  
(**nonaq. electrolytic soln.** with improved  
safety for **lithium battery**)

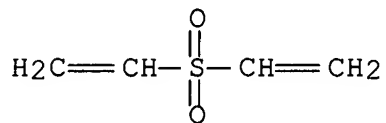
RN 67-71-0 HCA

CN Methane, 1,1'-sulfonylbis- (CA INDEX NAME)



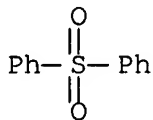
RN 77-77-0 HCA

CN Ethene, 1,1'-sulfonylbis- (CA INDEX NAME)



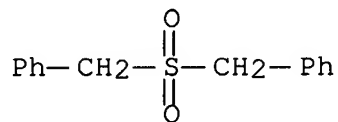
RN 127-63-9 HCA

CN Benzene, 1,1'-sulfonylbis- (CA INDEX NAME)



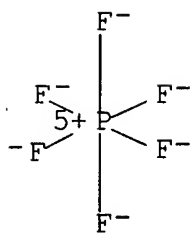
RN 620-32-6 HCA

CN Benzene, 1,1'-[sulfonylbis(methylene)]bis- (CA INDEX NAME)



RN 21324-40-3 HCA

CN Phosphate(1-), hexafluoro-, lithium (1:1) (CA INDEX NAME)



IC ICM H01M010-40

INCL 429326000; 429200000; 429340000; 429331000; 429332000

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST **lithium battery nonaq**

**electrolyte soln improved safety**

IT Esters, uses

Ethers, uses

Hydrocarbons, uses

(C1-20; **nonaq. electrolytic soln. with improved safety for lithium battery**)

IT Aromatic hydrocarbons, uses

(C5-20; **nonaq. electrolytic soln. with improved safety for lithium battery**)

IT Secondary batteries

(**lithium; nonaq. electrolytic soln. with improved safety for lithium battery**)

IT Battery electrolytes

(**nonaq. electrolytic soln. with improved safety for lithium battery**)

IT Polyesters, uses

(**nonaq. electrolytic soln. with improved safety for lithium battery**)

IT Alcohols, uses

(**polyhydric; nonaq. electrolytic soln. with improved safety for lithium battery**)

IT 3087-37-4, Tetrapropyltitanate

(**nonaq. electrolytic soln. with improved**

safety for **lithium battery**)

IT 502-44-3,  $\epsilon$ -Caprolactone 7439-93-2D, **Lithium**,  
salt 12190-79-3, Cobalt **lithium** oxide colio2

(**nonaq. electrolytic** soln. with improved  
safety for **lithium battery**)

IT 126-58-9DP, Dipentaerythritol, deriv.  
(**nonaq. electrolytic** soln. with improved  
safety for **lithium battery**)

IT 56-81-5, Glycerol, uses 67-71-0, Methyl sulfone  
71-43-2D, Benzene, halogenated 77-77-0, Vinyl sulfone  
94-36-0, Benzoylperoxide, uses 96-49-1, Ethylene carbonate  
105-64-6, Diisopropyl peroxy dicarbonate 105-74-8, Lauroyl  
peroxide 108-32-7, Propylene carbonate 115-77-5,  
Pentaerythritol, uses 126-33-0, Tetramethylene sulfone 126-58-9,  
DiPentaerythritol 127-63-9, Phenyl sulfone 456-55-3,  
Trifluoromethyl phenyl ether 462-06-6, Fluorobenzene  
620-32-6, Benzyl sulfone 623-53-0, Ethyl methyl carbonate  
1561-49-5, Dicyclohexyl peroxy dicarbonate 1712-87-4, m-Toluoyl  
peroxide 2972-19-2 3006-82-4, tert-Butylperoxy-2-ethylhexanoate  
9002-88-4, Polyethylene 9003-07-0, Polypropylene 14666-78-5  
15520-11-3, Bis(4-tert-butylcyclohexyl) peroxydicarbonate  
21151-56-4, Benzene, 1-chloro-4-(chloromethoxy)- 21324-40-3  
, **Lithium** hexafluorophosphate 28452-93-9, Butadiene  
sulfone 32752-09-3, Isobutyl peroxide 92177-99-6,  
3,3,5-Trimethylhexanoylperoxide 130038-50-5, 2-Propenoic acid,  
2-methyl-, ion(1-) homopolymer, uses 651294-25-6 651294-26-7  
651294-27-8

(**nonaq. electrolytic** soln. with improved  
safety for **lithium battery**)

L56 ANSWER 4 OF 4 HCA COPYRIGHT 2007 ACS on STN

139:294681 **Electrolyte for lithium battery**

to reduce overcharge and improve electrochemical characteristics.

Kim, Jun-Ho; Lee, Ha-Young; Choy, Sang-Hoon; Kim, Ho-Sung; Noh,  
Hyeong-Gon (Samsung SDI Co., Ltd., S. Korea). U.S. Pat. Appl. Publ.  
US 2003190529 A1 20031009, 19 pp. (English). CODEN: USXXCO.

APPLICATION: US 2003-393294 20030321. PRIORITY: KR 2002-18264  
20020403.

AB An electrolyte for a **lithium battery** includes a **nonaq. org. solvent**, a **lithium** salt, and  
an additive comprising (a) a compd. represented by the formula [(R1)<sub>n</sub>C6H(6-

n+m)(X)m], and (b) a compd. selected from the group consisting of a sulfone-based compd., a poly(ester)(meth)acrylate, a polymer of poly(ester)(meth)acrylate, and a mixt. thereof: wherein R1 is a C1-10 alkyl, a C 1-10 alkoxy, or a C6-10 aryl, and preferably a Me, Et, or methoxy, X is a halogen, and m and n are integers ranging from 1 to 5, where m+n is less than or equal to 6.

IT 7791-03-9, Lithium perchlorate 10377-51-2

, Lithium iodide (LiI) 14283-07-9,

Lithium tetrafluoroborate 18424-17-4,

Lithium hexafluoroantimonate 21324-40-3,

Lithium hexafluorophosphate 29935-35-1,

Lithium hexafluoroarsenate 33454-82-9,

Lithium triflate 90076-65-6 131651-65-5,

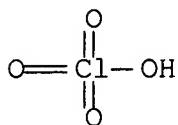
Lithium perfluorobutanesulfonate

(electrolyte for lithium battery to

reduce overcharge and improve electrochem. characteristics)

RN 7791-03-9 HCA

CN Perchloric acid, lithium salt (1:1) (CA INDEX NAME)



● Li

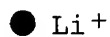
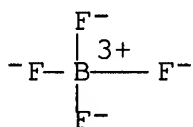
RN 10377-51-2 HCA

CN Lithium iodide (LiI) (CA INDEX NAME)

I—Li

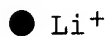
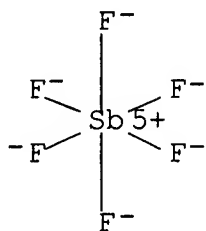
RN 14283-07-9 HCA

CN Borate(1-), tetrafluoro-, lithium (1:1) (CA INDEX NAME)



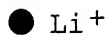
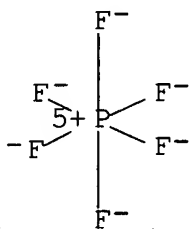
RN 18424-17-4 HCA

CN Antimonate(1-), hexafluoro-, lithium (1:1), (OC-6-11)- (CA INDEX NAME)



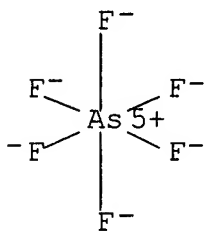
RN 21324-40-3 HCA

CN Phosphate(1-), hexafluoro-, lithium (1:1) (CA INDEX NAME)



RN 29935-35-1 HCA

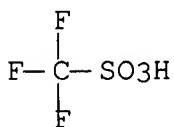
CN Arsenate(1-), hexafluoro-, lithium (1:1) (CA INDEX NAME)



● Li<sup>+</sup>

RN 33454-82-9 HCA

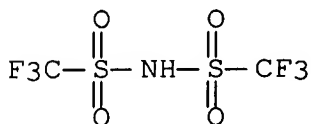
CN Methanesulfonic acid, 1,1,1-trifluoro-, lithium salt (1:1) (CA INDEX NAME)



● Li

RN 90076-65-6 HCA

CN Methanesulfonamide, 1,1,1-trifluoro-N-[(trifluoromethyl)sulfonyl]-, lithium salt (1:1) (CA INDEX NAME)

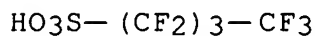


● Li



RN 131651-65-5 HCA

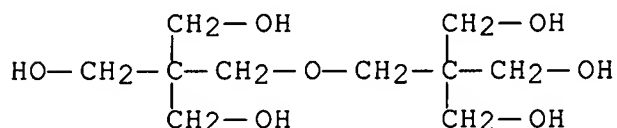
CN 1-Butanesulfonic acid, 1,1,2,2,3,3,4,4,4-nonafluoro-, lithium salt  
(1:1) (CA INDEX NAME)



IT 126-58-9DP, Dipentaerythritol, reaction product with  
ε-caprolactone  
(electrolyte for lithium battery to  
reduce overcharge and improve electrochem. characteristics)

RN 126-58-9 HCA

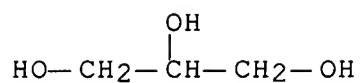
CN 1,3-Propanediol, 2,2'-[oxybis(methylene)]bis[2-(hydroxymethyl)- (CA  
INDEX NAME)



IT 56-81-5, Glycerol, uses 67-71-0, Methyl sulfone  
77-77-0, Vinyl sulfone 79-10-7D, Acrylic acid,  
ω-fatty acid esters C2-C21 79-41-4D, Methacrylic  
acid, ω-fatty acid esters C2-C21 127-63-9, Phenyl  
sulfone 620-32-6, Benzyl sulfone  
(electrolyte for lithium battery to  
reduce overcharge and improve electrochem. characteristics)

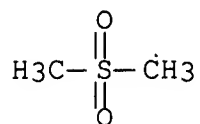
RN 56-81-5 HCA

CN 1,2,3-Propanetriol (CA INDEX NAME)



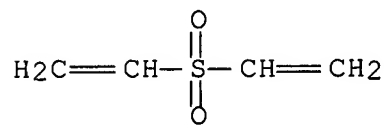
RN 67-71-0 HCA

CN Methane, 1,1'-sulfonylbis- (CA INDEX NAME)



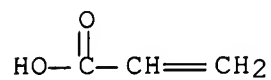
RN 77-77-0 HCA

CN Ethene, 1,1'-sulfonylbis- (CA INDEX NAME)



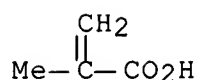
RN 79-10-7 HCA

CN 2-Propenoic acid (CA INDEX NAME)



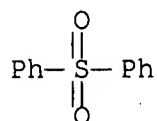
RN 79-41-4 HCA

CN 2-Propenoic acid, 2-methyl- (CA INDEX NAME)



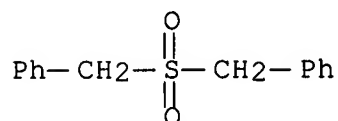
RN 127-63-9 HCA

CN Benzene, 1,1'-sulfonylbis- (CA INDEX NAME)



RN 620-32-6 HCA

CN Benzene, 1,1'-[sulfonylbis(methylene)]bis- (CA INDEX NAME)



IC ICM H01M006-18

INCL 429307000; 429309000; 429326000; 429322000; 429323000; 429330000

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST **lithium battery electrolyte overcharge**

lowering

IT **Battery electrolytes**

(**electrolyte for lithium battery to**

reduce overcharge and improve electrochem. characteristics)

IT **Secondary batteries**

(**lithium; electrolyte for lithium**

**battery to reduce overcharge and improve electrochem.**

characteristics)

IT Peroxides, uses

(org.; **electrolyte for lithium battery** to reduce overcharge and improve electrochem. characteristics)

IT Alcohols, uses

(trihydric; **electrolyte for lithium battery** to reduce overcharge and improve electrochem. characteristics)

IT 3087-37-4, Tetrapropyltitanate

(**electrolyte for lithium battery** to reduce overcharge and improve electrochem. characteristics)

IT 71-43-2, Benzene, uses 96-49-1, Ethylene carbonate 105-58-8, Diethyl carbonate 108-32-7, Propylene carbonate 108-88-3, Toluene, uses 462-06-6, Fluorobenzene 616-38-6, Dimethyl carbonate 623-53-0, Ethyl methyl carbonate 623-96-1, Dipropyl carbonate 1330-20-7, Xylene, uses 4437-85-8, Butylene carbonate 7447-41-8, **Lithium chloride (LiCl)**, uses 7791-03-9, **Lithium perchlorate 10377-51-2**, **Lithium iodide (LiI)** 12355-58-7, **Lithium aluminate (Li<sub>5</sub>AlO<sub>4</sub>) 14283-07-9**, **Lithium tetrafluoroborate 18424-17-4**, **Lithium hexafluoroantimonate 21324-40-3**, **Lithium hexafluorophosphate 27359-10-0**, Trifluorotoluene 29935-35-1, **Lithium hexafluoroarsenate 33454-82-9**, **Lithium triflate 35363-40-7**, Ethyl propyl carbonate, uses 56525-42-9, Methyl propyl carbonate, uses 90076-65-6 131651-65-5, **Lithium perfluorobutanesulfonate**

(**electrolyte for lithium battery** to reduce overcharge and improve electrochem. characteristics)

IT 126-58-9DP, Dipentaerythritol, reaction product with

ε-caprolactone 502-44-3DP, ε-Caprolactone, reaction product with dipentaerythritol 609772-45-4P

(**electrolyte for lithium battery** to reduce overcharge and improve electrochem. characteristics)

IT 56-81-5, Glycerol, uses 67-71-0, Methyl sulfone

77-77-0, Vinyl sulfone 79-10-7D, Acrylic acid, ω-fatty acid esters C2-C21 79-41-4D, Methacrylic acid, ω-fatty acid esters C2-C21 94-36-0, Benzoyl peroxide, uses 104-92-7, 4-Bromoanisole 105-64-6, Diisopropyl peroxy dicarbonate 105-74-8, Lauroyl peroxide 126-33-0, Tetramethylene

sulfone 127-63-9, Phenyl sulfone 149-32-6, Erythritol  
452-10-8, 2,4-Difluoroanisole 456-49-5, 3-Fluoroanisole  
459-60-9, 4-Fluoroanisole 620-32-6, Benzyl sulfone  
623-12-1, 4-Chloroanisole 1561-49-5, Dicyclohexyl peroxy  
dicarbonate 1712-87-4, m-Toluoyl peroxide 2398-37-0,  
3-Bromoanisole 2845-89-8, 3-Chloroanisole 3006-82-4,  
tert-Butylperoxy-2-ethyl-hexanoate 14666-78-5 15520-11-3,  
Bis(4-tert-butylcyclohexyl)peroxy dicarbonate 28452-93-9,  
Butadiene sulfone 32752-09-3, Isobutyl peroxide 92177-99-6,  
3,3,5-Trimethylhexanoyl peroxide 93343-10-3, 3,5-Difluoroanisole  
202925-08-4, 3-Chloro-5-fluoroanisole 609365-67-5

(electrolyte for lithium battery to  
reduce overcharge and improve electrochem. characteristics)

=>